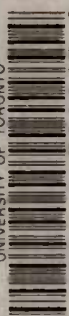


UNIVERSITY OF TORONTO



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Pierre Esquié

VIGNOLA



Bates & Guild Company

THE FIVE ORDERS
OF
ARCHITECTURE

F. MATHEUS, JR.

THE CASTING OF SHADOWS
AND
THE FIRST PRINCIPLES OF CONSTRUCTION

BASED ON THE SYSTEM OF

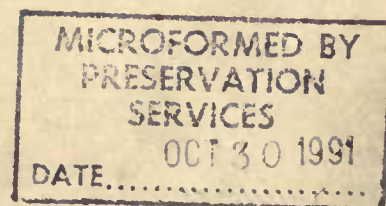
VIGNOLA

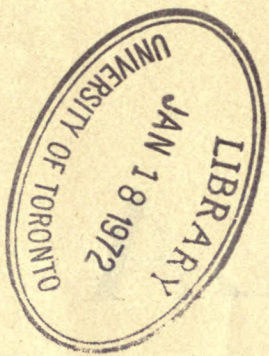
SEVENTY-SIX PLATES, DRAWN AND ARRANGED BY

PIERRE ESQUIÉ

ARCHITECT OF THE FRENCH GOVERNMENT
FORMER MEMBER OF THE FRENCH ACADEMY AT ROME

BOSTON, MASS.
BATES & GUILD COMPANY





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PREFACE

A general formulation of the proportions of the classical orders is accepted as a valuable aid, if not an essential, to both the study and the practice of architecture. Many such systematic arrangements of the orders have been made, but none have been more widely or more continuously used than that of Vignola. In the present edition of this time-honored work M. Pierre Esquié has retained all of the features of former editions which are of especial value to architects of today, and has added new and important material, thus rendering it the most complete and useful edition so far issued.

The addition of the Greek orders in a consistent form with the Roman orders of Vignola is here made for the first time. The details of stone-jointing and of vaulting, in the drawings of the porticoes of the different orders, and the clearer and better arrangement of many of the plates, are points of superiority which can be readily appreciated.

The explanatory notes upon each plate have been carefully translated into English, and the definitions, measurements and references to figures, scattered over the plates, have been gathered together in a glossary with their English equivalents. It has not, however, seemed advisable to give exhaustive definitions, as the only purpose of the glossary is to enable the student to comprehend the plates and follow the explanatory notes; consequently only the restricted sense in which the terms are used has been considered. In the case of many of the terms devoted to construction (Plates LXVII. to LXXVI.) the English may not even be the equivalent of the French in any other respect than that both refer to the same architectural form or member in the particular applications of this work.

PREFACE

The first of the two volumes of this work is devoted to a general survey of the history of the human mind, from the earliest times to the present day. The second volume is devoted to a more detailed examination of the various branches of human knowledge, and to a discussion of the principles which govern their development.

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EXPLANATION OF PLATES

PLATE I.

EXPLANATORY PARALLEL OF THE FIVE ORDERS OF ARCHITECTURE ACCORDING TO VIGNOLA; AND THEIR RELATIVE PROPORTIONS TO EACH OTHER.

An order is the combination of architectural elements necessary to hold up the solids above an opening. When complete the order consists of an entablature, a column and a pedestal. The pedestal is not, however, indispensable.

Since the relative proportions of these elements must vary according to the materials employed, or the degree of richness desired, the resulting combinations have been resolved into five types, which have been called the Tuscan, the Doric, the Ionic, the Corinthian and the Composite orders. The proportions, which are here given according to Vignola, are far from absolute, but one should not forget that they are a mean, and that by differing from them too much and without a reason there is risk even of absurdity.

This plate shows the parallel of the five orders of architecture given by Vignola. The proportions of the orders one to another can be seen by the scale of heights, divided into thirty-two parts, one part being assumed as the module. The Tuscan, the Doric and the Ionic have the same relative proportions, shown by the lines AA — BB — CC; that is to say, for these three orders the pedestal is one-third and the entablature one-fourth the height of the column. It is only for the Corinthian and Composite orders that Vignola has thought it necessary to change this proportion. While keeping the entablature one-fourth the height of the column he has raised the pedestal one-third of a module, thus making these two orders still more elegant. This makes the pedestal 7 modules high, instead of $6\frac{1}{2}$ as in the three previous orders. The module is divided into 12 parts for the first two orders and into 18 parts for the last three.

PLATE II.

DRAWING MOULDINGS.

The ability to draw straight lines and tangential curves with accuracy is indispensable if one would produce curves which have a continuous sweep. This operation (called in French *raccordement*) consists in so joining lines as not to leave any break between them. The process is employed in architecture in a multitude of ways, and especially in the drawing of mouldings.

Mouldings are divided into *simple* and *compound*. The principal simple mouldings are: the Cavetto, the Quarter-round and the Torus. The principal compound mouldings are the Cyma-recta, the Cyma-reversa and the Scotia.

The cavetto is, in profile, a concave quarter-circle, in which the projection is equal to the height. An examination of the three first figures of this plate will suffice to make clear the method of drawing it.

The cyma-recta is a sinuous moulding, the upper part of which is concave, and the projection of which equals the height. It is drawn as follows: The projection AC being taken equal to the height AB, the points B and C are joined by a straight line, which is divided in two equal parts at the point D. Upon the sides DB, DC of this line, construct, one inside and one outside, two equilateral triangles, which determine the centres, O, O' of the circular arcs CDB, which form the cyma-recta.

The cyma-reversa is a moulding formed by two continuous circular arcs; the method of drawing will be made clear by examination of the diagram.

The scotia is a hollow moulding placed ordinarily between two vertical supporting members. It is drawn as follows: Given the parallels mt, XT and their tangent points T and t, and any point in mt, as n. Erect the perpendiculars tO', Ti, nX. Take $Xy = \frac{1}{2} Xn$, and from y draw yi parallel to mt to intersect Ti at i. With i as centre describe the quarter circle TK. Extend io = $\frac{1}{2}$ Ki. From o as centre describe the arc KH equal to one-half the arc TK. Produce Ho to Z, making oZ = $\frac{1}{4}$ oH. Make tQ = HZ and join Q and Z, and at the centre of this line M erect the perpendicular MO'. The point Z will be the centre for HL and O' for Lt.

PLATE III.

TUSCAN INTERCOLUMNIATION.

FIGURE 1. Elevation of the Tuscan Intercolumniation.

FIGURE 2. Section of the Tuscan Portico.

FIGURE 3. Plan of the Tuscan Portico.

The distance from one column to another is called the Intercolumniation. The intercolumniation should never be so great that the stability of the structure, either real or apparent, may suffer, nor so narrow as to prevent the access of light, or easy passage between the columns. In a colonnade the intervals should be equal, unless there may be necessity to open a wider passage in the middle for a principal entrance.

Vignola, having found nothing in the buildings of antiquity which could serve as the type of the Tuscan order, has made it conform to the rules of Vitruvius, who says that the height of the column is seven times its diameter, including the capital and base, that is to say 14 modules.

To draw the Tuscan intercolumniation divide the whole height of the order into 5 parts, the upper part being taken for the entablature and the four remaining for the column. Divide these four parts into 14, and the $\frac{1}{14}$ part will be the length of the module, from which make a scale. Next draw perpendicular lines $6\frac{3}{4}$ modules apart for the axes of the two columns. Reserving one module for the base and one for the capital, there remain 12 modules for the shaft, which is cylindrical for one-third of its height, and diminishes progressively for the remainder of the height as far as the astragal, where it is 1 module and 7 parts in diameter. The diminution of the column will be explained in a later plate.

PLATE IV.

THE TUSCAN PORTICO WITHOUT PEDESTAL.

Arches are more substantial than stone lintels and consequently arcaded porticos are used for the lower stories of buildings. This plate shows the elevation of a Tuscan portico without pedestal. It will be seen that the columns are engaged in the pier $\frac{3}{8}$ of a diameter, or 9 parts.

Divide the whole height of the order, as for the intercolumniation, into five equal parts, of which four are to be given to the column and one to the entablature. Then divide the height of the column into fourteen parts to obtain the module, or half diameter, after which erect two perpendiculars $9\frac{1}{2}$ modules apart for the axes of the columns. Draw the piers, $1\frac{1}{2}$ modules on each side of these perpendiculars. Mark off one module from the top upon the middle line of the arch for the height of the keystone. Measure down again upon this line 3 modules and 3 parts, which is half the width of the *arcade**; this will at the same time give the centre of the arch and the height of the impost. Notice that this *arcade* is just twice as high as it is wide, the proportions generally adopted by Vignola.

The relation between the width of the opening and that of the pier may vary. The construction may appear heavy, when the width of the pier equals that of the opening; on the other hand it may seem thin and delicate, when the width of the opening is three times that of the pier. The most desirable proportion is that in which the pier is half the width of the opening.

It has been thought desirable to give an example of the method of laying out the stone-cutting of a portico, although this should vary in design according to the actual dimensions and the materials of which the portico is built.

* The French term *arcade* is used in this work for an opening in masonry composed of an arch supported either by columns or piers. It has no exact English equivalent; the French form is therefore used in the translation.

PLATE V.

THE TUSCAN PORTICO WITH PEDESTAL.

The order with pedestals is generally used in porticos which are to be closed with a balustrade, in order to avoid

the accidental meeting of the railing of the balustrade and the columns.

To draw the Tuscan portico with pedestal it is necessary first to divide the whole height into nineteen equal parts, of which three are given to the entablature, twelve to the column, and four to the pedestal.

To obtain the module the height of the column is divided into fourteen parts, as in the portico without pedestal. With this module as a unit it will be easy to draw the portico as indicated in the plate.

It will be seen that in this case again the arch is twice as high as it is wide.

Although the measurements given by Vignola for the thickness of the piers make them of satisfactory proportion, it is nevertheless allowable to modify these proportions, if need be, adapting them in such a way as to support properly the weight placed upon them.

It will be seen that in this portico also the columns are engaged one-third of their diameter.

Together with the elevations of the Tuscan porticos, in both cases, the sections taken on the axis of the *arcade* have been shown, in order to make clear what is meant by a section. They will be repeated for the other orders. The interiors of these porticos should be adapted to the construction and to the materials employed. The Tuscan order being simple it will be well to treat the interior with like simplicity.

PLATE VI.

THE TUSCAN PEDESTAL AND BASE.

- FIGURE 1. Elevation of the Base and the Pedestal.
 FIGURE 2. Section of the Base and the Pedestal.
 FIGURE 3. Profile of the Base and the Pedestal.
 FIGURE 4. Plan of the Base and of the Cornice of the Pedestal.
 FIGURE 5. Plan of the Base of the Pedestal.

The Tuscan order is simple and rude, its principal characteristic is force. It should have no applied ornament unless rustication or some like decoration be used.

Although it is not customary to use a pedestal in the Tuscan order, Vignola has thought it necessary to show one to carry out the plan he has adopted for his treatise upon the five orders. He makes the pedestal $\frac{1}{3}$ the height of the column, which gives it 4 modules and 8 parts, including the base and the cornice, to each of which $\frac{1}{2}$ module is allowed. The die is $3\frac{3}{4}$ modules high, and equal in width to the plinth of the base of the column, which is 2 modules and 9 parts. The height of the base of the column is 1 module, divided in two equal parts, one for the plinth and one for the torus with its cincture, the height of the latter being 1 part. In this order the cincture or listel C is not included in the height of the shaft.

It should be noted that the module is determined by the diameter of the column taken just above the base, which is always 2 modules. The module is divided into 12 parts, or minutes, for the Tuscan order.

When the pedestal is continued it is called a stylobate.

NAMES OF THE MEMBERS COMPOSING THE BASE AND THE PEDESTAL OF THE
TUSCAN ORDER

A. Shaft of the column.	} Base of the column.
B. Congé.	
C. Listel or cincture.	
D. Torus.	
E. Plinth of the base.	} Cornice of the pedestal.
F. Listel or Reglet.	
G. Cyma reversa.	
H. Dic.	} Base of the pedestal.
I. Congé.	
K. Fillet or listel.	
L. Plinth of the Pedestal.	

NOTE. — By an error of the engraver the semi-diameter of the torus and the plinth of the base is figured in the plan (Figs. 3 and 4), as 1 module $5\frac{1}{2}$ parts. This should be 1 module $4\frac{1}{2}$ parts, as will be seen by comparison with the other figures.

PLATE VII.

ENTABLATURE AND CAPITAL OF THE TUSCAN ORDER.

- FIGURE 1. Elevation of the Tuscan Capital and Entablature.
FIGURE 2. Section of the Capital and Entablature.
FIGURE 3. Impost of the Tuscan Arcade without Pedestal.
FIGURE 4. Impost of the Tuscan Arcade with Pedestal.

The Tuscan entablature is one-quarter the height of the column, which consequently makes it $3\frac{1}{2}$ modules, of which 1 module is given to the architrave, 1 module and 2 parts to the frieze, and the remainder to the cornice. In the section of this cornice the undercutting of the corona can be seen, which forms a drip to protect the rest of the entablature from water which might run down. The height of the capital is 1 module. The shaft of the column under the astragal is diminished 5 parts, or $2\frac{1}{2}$ parts on each side.

At the bottom of the plate is given the plan of the capital and entablature. It shows clearly the return of the cornice at the angle.

The figure at the left of the plate, which gives the impost and archivolt of the Tuscan arch with pedestal (the lower of the two figures), has not been made according to the measurements given by Vignola. It was thought necessary to correct Vignola's proportions in certain parts to give them more grace.

The entablature is divided into three parts, the architrave, the frieze and the cornice.

The architrave is the lower part of the entablature, that which rests immediately upon the capital of the column and serves to carry the members above it.

The frieze is the space which separates the architrave from the cornice.

The purpose of the cornice is to protect the walls against the action of rain water.

The purpose of the capital is to carry the architrave and to give a greater bearing for the entablature upon the column.

NAMES OF THE MOULDINGS OF THE ENTABLATURE AND CAPITAL OF THE
TUSCAN ORDER.

A. Quarter-round.	} Cornice.
B. Baguette, or astragal.	
C. Fillet.	
D. Corona.	
E. Listels.	
F. Cyma reversa.	

G. Frieze.	} Architrave.
H. Listel.	
I. Fascia of the architrave.	
K. Listel of the abacus.	
L. Fascia of the abacus.	} Capital.
M. Quarter-round or echinus.	
N. Fillet or annulet.	
O. Neck.	} Shaft.
P. Astragal.	
Q. Fillet or cincture.	
R. Shaft.	
S. Fillet.	} Impost.
T. Fascia of impost.	
U. Second fascia of impost.	
Y. Fascia of archivolt.	

PLATE VIII.

TEMPLE OF THE TUSCAN ORDER.

- FIGURE 1. Elevation of the Temple.
FIGURE 2. Plan.
FIGURE 3. Section.

There are given in this plate the principal elevation, the plan and the longitudinal section of a Tuscan temple, with antæ. The middle of the wall which separates the portico from the interior is occupied by a doorway ornamented with an architrave. The details of the pediment will be found in the following plate.

- | | |
|-----------------------------|-------------|
| A. Courses of stonework. | M. Portico. |
| B. Door-jamb or architrave. | N. Cella. |
| C. Plinth. | O. Steps. |
| D. Antæ. | |

PLATE IX.

DRAWING AND STUDY OF PEDIMENTS OF THE TUSCAN ORDER.

- FIGURE 1. Elevation of straight and curved Pediments.
FIGURE 2. Side elevation of Pediments.
FIGURE 3. Section.
FIGURE 4. Method of drawing straight Pediments.
FIGURE 5. Method of drawing curved Pediments.

A pediment is nothing more than a gable, ornamented or concealed; it is not then properly used unless the gable exists. It is rather difficult to establish what are to be accepted as the correct proportions for pediments because of the variation in antique buildings. The process here given is the one suggested by Serlio, which seems to have been very successful for the Tuscan and Doric orders. An examination of the figures will suffice to make clear the different methods employed in drawing.

PLATE X.

DORIC INTERCOLUMNIATION ACCORDING TO VIGNOLA.

To draw the Doric intercolumniation it is necessary to divide the whole height into five parts, one for the entablature and the four remaining for the column; or, as Vignola says, divide the height into twenty parts, one of which will

be the module. This module is divided, as in the Tuscan order, into 12 parts. The column will have 16 modules or eight times its greatest diameter. One module is given to the base, 1 to the capital, and 14 remain for the height of the shaft. The entablature has 4 modules, of which 1 is given to the architrave, $1\frac{1}{2}$ to the frieze and $1\frac{1}{2}$ to the cornice. All of these parts combined will make the height of the whole order, 20 modules.

In the frieze the triglyphs are always in line with the axes of the columns and are 1 module in width. The metopes are square and measure $1\frac{1}{2}$ modules. They can be enriched with various ornaments, such as heads of oxen, armor, *pateræ*, etc. The Doric intercolumniation is always determined by the number of the triglyphs. The column has 20 flutes. The contour of the shaft is drawn as in the Tuscan order.

PLATE XI.

DORIC PORTICO WITHOUT PEDESTAL.

To construct this Doric portico without pedestal, it is always necessary to divide the height into five parts, of which one is given to the entablature and four to the column; or else to divide the whole height into twenty parts, of which one will be the module. Mark off 10 modules for the distance from axis to axis, of which take 7 modules between the piers for the width of the arch, and allow 3 modules for the width of the piers. This will result in a proper division of the triglyphs and metopes.

The arch will be twice as high as it is wide. It should be noted that the column should project $\frac{1}{3}$ module more than half its diameter, in order that the projection of the imposts, which is also $\frac{1}{3}$ module, shall not protrude beyond the plane of the diameter of the column, which is parallel with the face of the pier. This is done in order that the projection of the imposts may not intersect disagreeably with the columns.

PLATE XII.

DORIC PORTICO WITH PEDESTAL.

The Doric portico with pedestal is generally employed for large openings; examples of it are found in the façades of city gates and in public buildings.

It is to be noted that the columns in this arrangement of the order are almost entirely accessory and decorative, on account of their wide spacing.

It is necessary, says Vignola, if it is desired to erect a portico or a loggia decorated with the Doric order with pedestals, to divide the whole height into $25\frac{1}{3}$ parts and to make one of these parts the module. Then make the distance from one pier to the next (in the clear) 10 modules, and the width of each pier 5 modules. These measurements are necessary in order to obtain the proper distribution of the triglyphs and metopes in the entablature. The *arcade* will consequently be just twice as high as it is wide, that is, 20 modules in height.

Although the measurement of $2\frac{1}{2}$ modules is given in the figure, the thickness of the pier should be left to the archi-

tect who employs this arrangement of the order, for the piers should have a thickness properly proportioned to the weight they are required to support and to the thrust of the vaults.

The details of this exercise are given in the following plates.

PLATE XIII.

PEDESTAL AND BASE OF THE DORIC ORDER.

- FIGURE 1. Elevation of the Pedestal and Base of the Doric Order.
 FIGURE 2. Section of the Pedestal and Base.
 FIGURE 3. Profile of the Pedestal and Base.
 FIGURE 4. Plan of the Base.
 FIGURE E. Flute drawn with an equilateral triangle.
 FIGURE F. Flute drawn with a semi-circle.

As in the Tuscan order, the module is here divided into 12 parts or minutes. The pedestal is 5 modules and 4 parts high, or $\frac{1}{3}$ the height of the column; the base of the column has 1 module, and a *baguette* or astragal, measuring 1 part in height, is placed above the torus, reducing the height of the latter by this amount, which renders this base more elegant and lighter than that of the Tuscan order. Doric columns can be made either with or without flutes. To obtain the flutes the circumference of the column is divided into 20 equal parts. The chords of these 20 arcs serve as the bases of as many equilateral triangles, of which, in each case, the apex is the centre from which a portion of a circle can be described to form the flute, as in Fig. E. If it is desired to make the flutes more pronounced (Fig. F.), join the points b c by a straight line, elevate the perpendicular a d, and describe the semi-circle b d c, and the point d will be the centre from which an arc can be described giving the deeper flute.

The section of the pedestal shows the undercutting of the corona, or drip, the purpose of which is to stop the running down of rainwater, which otherwise would quickly deteriorate the other parts of the pedestal.

NAMES OF THE MOULDING COMPOSING THE BASE AND THE PEDESTAL OF THE DORIC ORDER.

a. Shaft.	A. Base of the column.	
b. Lower congé of shaft.		
c. Annulet, or cincture, or fillet.		
d. Astragal, or baguette, or baton.		
e. Torus.		
f. Plinth of base.	B. Cornice of the pedestal.	
g. Fillet or listel.		
h. Quarter-round or echinus.		
i. Corona.		
j. Drip.	C. Die of the pedestal.	
k. Cyma reversa.		
l. Die.	D. Base of the pedestal.	
m. Congé.		
n. Astragal or baguette.		
o. Inverted cyma reversa.		
p. Upper plinth.		
q. Lower plinth.		

PLATE XIV.

ENTABLATURE AND CAPITAL OF THE
DENTICULAR DORIC ORDER.

- FIGURE 1. Elevation of the Entablature and Capital of the Denticular Doric Order.
 FIGURE 2. Section of the Entablature and Capital.
 FIGURE 3. Plan of the Capital.
 FIGURE 4. Impost and Archivolt of the *Arcade* without Pedestal.
 FIGURE 5. Impost and Archivolt of the *Arcade* with Pedestal.
 FIGURE 6. Section of the Cornice upon the line AB.
 FIGURE 7. Plan of the Cornice and of the Denticular Frieze.

This plate gives the different details of the Denticular Doric order.

The entablature is one-fourth the height of the column, and the capital is 1 module high. The triglyphs are each 1 module in width; the incised spaces in them are called channels, the object of which is to accentuate the function of the triglyph, which is to support the cornice, the metope being only a filling in. The metopes should always be square and may be ornamented with heads of animals, trophies of war, etc.

This order is usually employed in the lower stories of buildings.

- | | |
|--------------------------|-----------------------------|
| A. Cavetto. | D. Triglyphs with channels. |
| B. Dentils. | E. Guttæ. |
| C. Capital of triglyphs. | H. Metope. |

PLATE XV.

ENTABLATURE AND CAPITAL OF THE
MUTULAR DORIC ORDER.

- FIGURE 1. Elevation of the Entablature and Capital of the Mutular Doric Order.
 FIGURE 2. Section of the Entablature and Capital.
 FIGURE 3. Plan of the Capital.
 FIGURE 4. Section, following the line AB, of the Cornice.
 FIGURE 5. Plan of the Cornice and of the Frieze.

This order is obviously different from the preceding one. In the cornice the cavetto is replaced by a cyma-recta and the cyma-reversa by a quarter-round. The mutules, which are not used in the Denticular Doric, give a greater solidity to the cornice and contribute to its enrichment. The architrave has two faces instead of one, and the mouldings of the capital are ornamented.

The Mutular Doric order, richer than the Denticular, is the one most used both in public and private buildings.

At the left of Figure 4. Detail of a gutta, or drop, in the soffit of the mutule. Detail of the gutta, or drops, in the architrave under the triglyph.

- A. Cymatium, or cyma recta.
 B. Mutule, with gutta.
 C. Second fascia of the architrave.
 D. First fascia of the architrave.

PLATE XVI.

TEMPLE OF THE DORIC ORDER.

- FIGURE 1. Elevation of a Temple of the Doric Order.
 FIGURE 2. Plan of the front portion of the Temple.
 FIGURE 3. Section upon the axis of the Doorway.

This plate represents a Mutular Doric portico of three intercolumniations. The intercolumniation is determined by the number of triglyphs. The maximum of three intermediate triglyphs should never be exceeded. See the following plate for the method of drawing the pediment.

- A. Courses of masonry.
 B. Cornice of the doorway.
 C. Frieze of the doorway.
 D. Door-jamb or architrave.
 E. Plinth.

PLATE XVII.

DRAWING AND STUDY OF PEDIMENTS OF
THE DORIC ORDER.

The method of drawing used in this plate is based upon the same principles as those given for the Tuscan order. An examination of the plate will show clearly to the student the way to draw the inclined mouldings. Figure 1 shows the pediment of the Denticular Doric; Figs. 2 and 3 show the junction of the horizontal and inclined mouldings. It is to be noted that the cavetto has a small horizontal portion which it is impossible to avoid. Figure 4 represents the pediment of the Mutular Doric, and Figs. 5 and 6 the joining of the inclined and horizontal mouldings, as well as the exact form of the cyma-recta at the apex of the pediment.

PLATE XVIII.

THE IONIC INTERCOLUMNIATION.

The Ionic intercolumniation is laid out in the same way as that of the Tuscan and Doric, by dividing the whole height of the order into five equal parts, of which the four lower make the height of the column. This height (of the column) is divided into eighteen parts, which will give the module. The module of this order is divided into 18 parts, or minutes, to measure the various mouldings, this division being necessary because of the great number of mouldings, which are also more delicate than in the two preceding orders.

The Ionic order is frequently employed for interior treatment on account of its elegance, or on the exterior in the upper stories of buildings. The ancients used it in numerous temples, a good example of which is the Temple of Fortuna Virilis at Rome.

It should be noted that the angle capital A returns at the angle in such a way as to present volutes on both faces.

PLATE XIX.

IONIC PORTICO WITHOUT PEDESTAL.

In order to draw the Ionic portico without pedestal, divide the height, as in the preceding plate, into five equal parts, the upper part for the entablature and the four lower for the column. The *arcade* is always twice as high as wide.

The columns are engaged in the pier $\frac{2}{3}$ of a module.

The Ionic portico can be used to advantage in the second story of courtyards of palaces or of public buildings which call for a rather ornate treatment.

Students will do well to practise drawing this portico owing to the difficulty of drawing the volutes on a small scale.

NOTE. — In the note upon this plate it is stated that the columns are engaged one-third of a module; this is an engraver's error and should be one-third of a diameter.

PLATE XX.

IONIC PORTICO WITH PEDESTAL.

The Ionic portico with pedestal is used as a rule in large buildings, and especially for the principal story. The relation of its parts, and its individual forms, are more elegant than those of the two preceding orders, the character of which is more that of strength and solidity.

To draw the Ionic portico with pedestal it is necessary to divide the whole height into $28\frac{1}{2}$ parts or modules.

The pedestal, including its base and cornice, should be 6 modules in height, that is, one-third the height of the column. There will be left, therefore, $4\frac{1}{2}$ modules for the height of the entablature, according to the rule adopted by Vignola. The width of the pier is 4 modules and the *arcade* is always twice as high as it is wide.

The section, made upon the axis of the *arcade*, shows a barrel vault with rib arches at right angles to the columns and the penetrations.

PLATE XXI.

PEDESTAL AND BASE OF THE IONIC ORDER.

FIGURE 1. Elevation of the Pedestal and of the Base of the Ionic Order.

FIGURE 2. Section of the Pedestal and of the Base.

FIGURE 3. Profile of the Pedestal and of the Base.

FIGURE 4. Plan of the Base.

The Ionic order occupies, by reason of its form and decoration, the position of mean between the Doric on the one hand, which represents strength and solidity, and the Corinthian on the other, which is the complete type of elegance and richness. The refined taste of the Greeks required something between these two systems, the one simple and severe, and the other more graceful, richer and more noble.

The Ionic pedestal which is given in this plate is one-third the height of the column, that is, 6 modules. Its base

and cornice are each $\frac{1}{2}$ module high, the die 5 modules, including the two fillets. The base of the column given here is that of Vignola. An example will be given later of the Attic base, employed by the ancients. This base is 1 module high, not including the listel or cincture. The shaft of the column is ornamented with 24 semi-circular flutes, which terminate squarely at the beginning of the congé. The width of the listel between the flutes is $\frac{2}{7}$ of that of the flutes.

A. Semi-circular flute.

B. Side of the flute, or listel.

C. Congé.

D. Listel.

E. Torus.

F. Upper scotia.

G. Baguettes or astragals.

H. Lower Scotia.

PLATE XXII.

ENTABLATURE AND CAPITAL OF THE IONIC ORDER WITH CUSHION.

FIGURE 1. Elevation of the Entablature and Capital of the Ionic Order.

FIGURE 2. Section of the Entablature and Capital.

FIGURE 3. Profile of the Capital.

FIGURE 4. Plan of the Angle Capital.

This plate represents at large scale the details of the entablature and capital of the Ionic order, as well as the imposts of this order. The capital given is that of an angle column, based upon the proportions of the Temple of Fortuna Virilis at Rome. By reason of this special arrangement the capital is symmetrical when seen diagonally. The other capitals of a series are made up of two parts similar to A, Fig. 1.

At the left of Figure 1 (upper drawing). Impost and archivolt of the *arcade* without pedestal. (Lower drawing.) Impost and archivolt of the *arcade* with pedestal.

PLATE XXIII.

STUDY OF THE VOLUTE AND CUSHION OF THE IONIC CAPITAL.

FIGURE 1. Face of the Ionic Capital.

FIGURE 2. Plan of the Capital.

FIGURE 3. Profile of the Capital showing the detail of the Cushion.

FIGURE 4. Second method of drawing the Volute.

Two methods of drawing the volute are given. For the first see Fig. 1.

Having drawn the cathetus* of this first volute, and having prolonged the upper line of the astragal which will intersect the cathetus at right angles in the centre of the eye of the volute at a distance of 1 module from the axis of the column, inscribe a square in the eye of the volute as shown in the detail, Fig. A. Then draw two diagonals through the centre of the eye of the volute, perpendicular to the sides of the square, and divide the distance from the centre to the side of the square into three equal parts. This will give twelve points which will serve as centres for portions of circles, which together will make up the three revolutions

* The cathetus is the vertical line passing through the centre of the eye of the volute.

of the spiral of the volute. To describe this spiral begin by taking the point 1 (Fig. A.) as a centre, and with the radius 1 B describe a quarter circle from B, terminating at the horizontal line 1 2; then with the point 2 as centre, and radius the distance from 2 to the extremity of the quarter circle just described, draw a second quarter circle, and repeating this operation as far as the point 12 the outer arris of the listel of the volute will be obtained. To obtain the other arris, divide each of the three parts of the semi-diameters of the square into four equal parts and from each of these divisions next adjoining the successive centres for the first spiral describe twelve other quarter circles which will give the other spiral of the listel. The dotted lines passing through the centre point indicate the terminations of the quarter circles.

Second method. To construct the volute by the method shown at the bottom of this plate, draw the line called the cathetus 16 parts of a module in length, 9 parts above and 7 parts below, and at the centre thus obtained draw the eye of the volute and divide its circumference in eight parts by diagonals, as shown. Then construct the auxiliary triangle BAC, of which the side BA will be 9 parts and AC 7 parts of a module. What remains will be easily understood from the drawing, the distances A1, A2, etc., being marked off from the centre of the eye on the eight diagonals. To draw the contour join the points 1 and 2 by a straight line, and at its centre erect a perpendicular. With 1 as a centre and the distance 1A as radius, cut this perpendicular, which will give the centre for the arc of a circle which will join 1 and 2. Then repeat the same operation for the remainder of the spiral. The points on the eight diagonals can be joined by a curve drawn free-hand without using compasses. For the width of the listel mark off on the eight diagonals the corresponding distances on the line A'B', and follow the same method as above.

The cushions, Figs. 2 and 3, should be drawn free-hand, in order to give them a more graceful form; nevertheless, in order to facilitate the drawing, a method of constructing them mechanically is given.

- AB. Perpendicular line called the cathetus.
- A. Eye of the volute with detail of the points of centre.
- D. Eggs. E. Shell of eggs. F. Darts. G. Pods.
- H. Profile of the cushion from the side.
- I. Section of the volute upon the line AB.

NOTE. — It is to be regretted that the ornaments of eggs and darts and pods upon the echinus of the capital, shown in Fig. 1, are not accurately drawn. If these ornaments be drawn upon the plan (Fig. 2) and produced point by point from plan to elevation, the inaccuracy will quickly be made evident.

PLATE XXIV.

ENTABLATURE AND CAPITAL OF THE IONIC ORDER WITH FOUR VOLUTES.

- FIGURE 1. Entablature and Capital with four Volumes.
- FIGURE 2. Section of the Entablature and Capital.
- FIGURE 3. Base.
- FIGURE 4. Section of the Base.
- FIGURE 5. Plan of the Capital with four Volumes.

Because of the difficulty experienced in using satisfactorily the Ionic capital at the angle of a building, the Ionic

order with four volutes without a cushion is sometimes used. As Vignola has not given an example of this disposition of the order, that adopted by Scamozzi is here shown.

PLATE XXV.

THE TEMPLE OF FORTUNA VIRILIS AT ROME.

In order to complete the explanation of the Ionic order an example is given of a temple built by the Romans, dedicated to Fortuna Virilis. It is the most beautiful example of this order which has been preserved to us in so complete condition. It seems advisable to place it before beginners in order to persuade them from the beginning of their studies of the art of architecture never to depart from good traditions and to familiarize themselves thoroughly with the beauties of antiquity.

PLATE XXVI.

CORINTHIAN INTERCOLUMNIATION.

To draw the Corinthian intercolumniation divide the whole height into 25 parts, one of which will be the module, which is divided in 18 parts or minutes, as in the Ionic order. Vignola establishes the distance between the columns at $4\frac{1}{2}$ modules, in order to arrange the spacing of the modillions in the cornice so that one may always be in line with the axis of the column.

This order, distinguished above all the others by its magnificence, should be employed principally for great monuments, such as temples and palaces.

NOTE. — By a mistake of the engraver the distance between the columns is given in the note as $4\frac{1}{2}$ instead of $4\frac{3}{4}$ modules.

PLATE XXVII.

CORINTHIAN PORTICO WITHOUT PEDESTAL.

This arrangement of the portico without pedestal is obtained by dividing the whole height into 25 parts, one of which will be the module. The explanations given in the preceding plates are not repeated here, the proportions of the height of the column and entablature being the same.

The width of the arcade is 9 modules and its height 18, or double the width.

Few examples of the Corinthian portico without pedestal are found in execution. It is advisable, moreover, not to use this arrangement of the order without some kind of sub-base under the piers, in order that the base, which is formed of delicate mouldings, may not be placed directly upon the ground, at the risk of being quickly damaged.

The section shows the intersection of the arch with a barrel vault, the width of which may vary according to circumstances.

NOTE. — By a mistake of the engraver the height of the arcade is figured in the section 8 instead of 18 modules.

PLATE XXVIII.

CORINTHIAN PORTICO WITH PEDESTAL.

To draw this Corinthian portico with pedestal, divide the whole height in 32 parts, of which one will be the module, and give 12 modules to the width of the *arcade*, and 16 from axis to axis of the columns, making the piers 4 modules in width.

This portico and that of the Composite order are the only ones in which Vignola departs from the uniform proportion of the *arcade*, the height twice the width. This is done to give the order greater delicacy and grace, and also to give greater height to the keystone, thereby making the latter more serviceable.

A section through the axis of the *arcade* is given in order to make clear the relation of the exterior to the interior when a groined vault is used.

The thickness of the pier may vary according to the weight and thrust which it may have to support.

This arrangement of the order is employed in the most important class of monuments and in the upper stories of buildings.

PLATE XXIX.

PEDESTAL AND BASE OF THE CORINTHIAN ORDER.

FIGURE 1. Elevation of the Base and of the Pedestal of the Corinthian Order.

FIGURE 2. Section of the Base and of the Pedestal.

FIGURE 3. Profile of the Base and of the Pedestal.

The module of the Corinthian order is divided into 18 parts or minutes. In this order Vignola makes an exception to the general rule that the pedestal should be one-third of the height of the column. This is done to give it grace to correspond with the rest of the order. Vignola advises making it 7 modules in height; thus the die of the pedestal is twice as high as wide, or the equivalent of two superposed squares. The plinth of the base of the pedestal may be heightened, giving it 8 parts instead of 4.

The base of the column shown in the plate is that given by Vignola. The ancients sometimes used instead the so-called Attic base, the mouldings of which are more beautifully proportioned.

PLATE XXX

ENTABLATURE AND CAPITAL OF THE CORINTHIAN ORDER.

FIGURE 1. Elevation of the Corinthian Entablature and Capital.

FIGURE 2. Section of the Entablature and Capital.

FIGURE 3. Section of the Cornice.

FIGURE 4. Plan of the Cornice.

FIGURE 5. Impost and Archivolt of the *Arcade* without Pedestal.

FIGURE 6. Impost and Archivolt of the *Arcade* with Pedestal.

The height of the entablature is divided into 10 parts, of which 3 are given to the architrave, 3 to the frieze and 4 to the cornice. Above each modillion on the cyma is placed

a decorative motive or lion's head. In ancient buildings these were rainwater outlets; but in modern buildings they are only used for overflows.

PLATE XXXI.

STUDY OF THE CORINTHIAN CAPITAL.

FIGURE 1. Diagonal projection of the Corinthian Capital.

FIGURE 2. Plan, looking up, of the Capital.

FIGURE 3. Elevation of the Corinthian Pilaster Capital.

FIGURE 4. Plan of the Pilaster Capital.

FIGURE 5. Profile of the Keystone of the Arch.

FIGURE 6. Elevation of the Keystone of the Arch.

The Corinthian capital is ornamented by two rows of leaves, of the same height, and placed so that those of the upper row alternate with those of the lower. From between the leaves of the upper row spring the cauliculi from which start the volutes, terminating the capital. Upon the volutes is placed the abacus, which is composed of three members, the cymatium, the listel and the fascia of the abacus.

Vignola makes the Corinthian capital 2 modules and 6 parts high, of which 2 modules are for the vase and 6 parts for the abacus. All the other dimensions are indicated on the plate, and by carefully comparing the plan and profile they can be easily understood.

In Figures 3 and 4 are given the elevation and plan of the Corinthian pilaster capital. This pilaster is used either separately or behind columns, or upon the angles of buildings. The heights of the leaves and of the members of the mouldings are the same as in the capital of the column, but while the shaft of the column is 30 parts in diameter just below the capital, that of the pilaster is 34. The shaft of the column has 24 flutes and the pilaster has 7 upon its face.

A. Cymatium. B. Fascia of the abacus. C. Volute.
D. Leaf of the cauliculus. E. Larger leaf.
F. Smaller leaf. G. Rose.

PLATE XXXII.

CORINTHIAN PEDIMENT.

In a pediment the triangular space inclosed by the three cornices is called the tympanum. It was in this space that the ancients placed figures, by means of which it has been possible to identify beyond question so many temples. The Corinthian temples, on account of the richness of the order, almost always bore this kind of decoration. Sometimes also, figures or other motives, forming a silhouette, were placed above these pediments, at the angles or at the apex.

At the right of plate: Section upon the line AB. At the left bottom corner: Profile of modillion and face of modillion.

PLATE XXXIII.

CORINTHIAN TEMPLE.

This plate gives an example of a hexastyle temple of the Corinthian order. It should be noted that the scales given are in metres and not in modules, in order to give a conception of the actual proportions.

PLATE XXXIV.

COMPOSITE INTERCOLUMNIATION.

To draw the Composite intercolumniation the same method is employed as that which has already served for the Corinthian order. It is necessary, however, always to give the shaft an entasis* of $\frac{1}{2}$ part at a point one-third the way up, and to diminish it progressively from this point to the astragal.

* See Plate XLIV.

PLATE XXXV.

COMPOSITE PORTICO WITHOUT PEDESTAL.

This portico is employed for the same class of structures as that of the Corinthian order. It is drawn in the same way, by dividing the whole height into five parts, the upper part for the entablature and the four others for the column. The *arcade* is exactly twice as high as it is wide.

In the section the interior is assumed to be barrel-vaulted in such a way as to avoid the penetrations of the arches.

PLATE XXXVI.

COMPOSITE PORTICO WITH PEDESTAL.

This portico can be used for the façades of palaces, as well as in galleries and in great halls, and for all places where it is desirable to decorate, architecturally, with great richness.

For explanation see Plate XXVIII., upon the Corinthian portico with pedestal.

The section shows a domical vault with pendentives.

PLATE XXXVII.

PEDESTAL AND BASE OF THE COMPOSITE ORDER.

FIGURE 1. Elevation of the Pedestal and of the Base of the Composite Order.

FIGURE 2. Section.

FIGURE 3. Profile.

The proportions of the pedestal and base of the Composite order are the same as those of the Corinthian, the only difference being in the mouldings of the cyma and the base of the pedestal. Vignola did not ornament the mouldings of this pedestal, but it is not necessary to regard this as an absolute rule, as the order is a combination of the Ionic and Corinthian orders.

The shaft of the column, like the Corinthian, has 24 flutes. The width of the listels between the flutes is $\frac{2}{3}$ of the width of the flute.

PLATE XXXVIII.

ENTABLATURE AND CAPITAL OF THE COMPOSITE ORDER.

FIGURE 1. Elevation of the Composite Entablature and Capital.

FIGURE 2. Section of the Entablature and Capital.

FIGURE 3. Section of the Cornice.

FIGURE 4. Plan of the Cornice.

FIGURE 5. Impost of the Archivolt of the *Arcade* without Pedestal.

FIGURE 6. Impost of the Archivolt of the *Arcade* with Pedestal.

In the Composite order Vignola has departed from the rule given for the Corinthian order by not making a dentil come directly in line with the axis of the column. This irregularity is not important, as in the case of modillions, because the ornaments are not of sufficient size for the eye readily to perceive it.

PLATE XXXIX.

HALF OF THE UPPER PART OF THE COMPOSITE CAPITAL SEEN UPON THE ANGLE.

The Composite capital is drawn in the same way as the Corinthian, the only difference being in the volutes. This part only is given in order to better show the detail. The construction of the spiral of the volute is the same as that described in Plate XXIII. for the Ionic order.

PLATE XL.

ARCH OF TITUS AT ROME.

Section, Principal Elevation and Side Elevation.

The arch of Titus, of which a restoration is here given, will make it possible to judge of the manner in which the ancients employed the Composite order. This order can be used for monuments which do not require great severity of treatment.

PLATE XLI.

SUPERPOSITION OF THE ORDERS.

FIGURE 1. Elevation of the two Orders superposed.

FIGURE 2. Section.

FIGURE 3. Plan.

FIGURE 4. Plan of one of the first-story Piers.

In this plate is given a simple example of the superposition of the Ionic above the Doric order, taken from the Theatre of Marcellus at Rome.

It is to be noted that the Ionic column is shorter than that of the Doric by the length of one module of the Doric order, or one-half a diameter.

PLATE XLII.

SUPERPOSITION OF THE ORDERS.

- FIGURE 1. Elevation.
 FIGURE 2. Section.
 FIGURE 3. Plan of the Lower Story.
 FIGURE 4. Plan of the Upper Story.

This example of the superposition of the Ionic order above the Doric is taken from the interior court of the Farnese Palace, Rome. Notice the disposition of the angle, a plan of which is given for both stories. The plan of the upper story is indicated in dotted lines on that of the lower story.

PLATE XLIII.

STUDY OF THE PROPORTIONS OF THE ORDERS.

- FIGURE 1. Elevation of the Portico of Octavia.
 FIGURE 2. Plan.
 FIGURE 3. Detail.

When two orders are juxtaposed the smaller is generally made two-thirds the height of the larger. It is well not to depart too far from this proportion, when it cannot be followed exactly. As an example, the Portico of Octavia at Rome, which follows this rule, is given.

PLATE XLIV.

MANNER OF FORMING THE PROFILE OF COLUMNS.

- FIGURE 1. Method for the Tuscan and the Doric. The Tuscan shaft tapers from a point one-third the way up.
 FIGURE 2. Method for the Ionic, the Corinthian and the Composite. The Corinthian shaft is swelled at one-third its height.
 FIGURE 3. Shaft of a twisted column.

The diminution or the entasis of columns can be obtained in several ways. The two methods which Vignola considered best are here given.

Figure 1. — Determine first the height and thickness of the column and the amount of diminution in the upper two-thirds. Then describe a semi-circle on the diameter at one-third the height of the column, at the point where it begins to diminish, and divide the arc AB into as many parts as desired, the point B being the projection of B'. The remainder of the process will be made clear by examining the figure.

Figure 2. — The various given points being established as in Fig. 1, for the Tuscan and Doric columns, the diameter at one-third the height being in the present case 2 modules, $2\frac{2}{3}$ parts, produce the line PO indefinitely, and from M as a centre with the radius PQ, describe an arc cutting the axis in R, and draw the line MRO. From O draw as many lines

as it is desired to obtain points, in each case making the distance from the axis to the profile of the shaft the same; for example, making ST = PQ.

Figure 3. — If it is desired to make a twisted column, first draw one of the straight columns. Then draw the small cylinder, shown in plan at E, to determine the eccentricity of the axis of the column. Divide the circle in 8 equal parts and from these points draw four lines parallel with the cathetus or axis of the straight column. Divide the height of the column into 48 equal parts, and draw the spiral in the small cylinder in the centre of the column. From this centre carry out on the 48 diameters the corresponding dimensions of the straight column, line for line. It is to be noted that the numbers 1, 2, 3, 4 represent only one-half a revolution of the spiral, going up, because this first revolution begins at the centre. In all the rest follow the circumference of the little circle, except in the upper circumvolution which is the same as the lower one and ends at the centre.

NOTE. — The term entasis (French *renflement*) when applied to columns is properly used only for swelling; that is to say, for columns which increase in diameter from the base to a point, say, one-third the way up, and then diminish toward the top.

PLATE XLV.

PARALLEL OF BALUSTRADES.

- FIGURE 1. Tuscan Balustrade.
 FIGURE 2. Doric Balustrade.
 FIGURE 3. Ionic Balustrade.
 FIGURE 4. Corinthian Balustrade.

The balustrade is nothing more than a support or elbow-rest. Its height is sometimes a little more and sometimes a little less than a metre. It should be raised upon a plinth sufficiently to allow its base to be seen above the projection of the cornice when viewed in perspective. The pedestals limiting a balustrade should always be in proper relation, as to richness of ornamentation, to the order with which the balustrade is used. A balustrade should not be confounded with an attic, the former being always in scale with the human form, while the latter is proportioned to the scale of the building as a whole.

The four principal types of balustrade are given in this plate, the metre and not the module being taken as the unit of measure.

PLATE XLVI.

INTERCOLUMNIATION OF THE GREEK DORIC ORDER.

The various Greek temples of which the remains are known were all of different proportions. A drawing is given in this plate of a Doric order which follows very closely the Parthenon at Athens.

To find the module of this order, the desired height being given, divide the whole height in $14\frac{1}{2}$ parts, one of

which will be the module, 11 parts being given to the column and $3\frac{1}{2}$ to the entablature. Directions in detail for drawing this order are given in Plate XLVII.

It should be noted that, as in the other Doric orders previously given, the module is divided in 12 parts, and in order to give the measurements for the smaller details each of these parts is subdivided into 12 minutes.

PLATE XLVII.

ENTABLATURE AND CAPITAL OF THE GREEK DORIC ORDER.

- FIGURE 1. Elevation of the Entablature and Capital of the Greek Doric Order.
 FIGURE 2. Section of the Entablature and Capital.
 FIGURE 3. Section of the Cornice on the side.
 FIGURE 4. Side Elevation of the Cornice.
 FIGURE 5. Section of the Triglyph.
 FIGURE 6. Plan of the Shaft of the Column at its Base.

In this plate is given a drawing of an entablature and capital of the Greek Doric order, closely resembling that of the Parthenon at Athens. It should be noted that the column represented, which is the corner column, does not follow the usual rule, being 2 modules and 6 minutes in diameter at the base. The other columns should be exactly 2 modules in diameter. This difference arises from the fact that the column is slightly inclined inward to give greater stability. It should also be noted that the triglyph in the Greek orders is at the angle of the frieze and not upon the axis of the column, as in the Roman and Renaissance Doric. This arrangement is much more logical, the triglyphs being supports for the cornice and the metopes merely filling of the space between.

PLATE XLVIII.

INTERCOLUMNIATION OF THE GREEK IONIC ORDER.

To draw the Greek Ionic intercolumniation divide the whole height into $21\frac{1}{2}$ parts, one of which will be the module. Take 4 parts for the entablature and $17\frac{1}{2}$ for the column. The module will be divided into 18 parts, and, for the subdivisions, each part into 18 minutes. For detailed instructions, see Plate XLIX.

PLATE XLIX.

ENTABLATURE, CAPITAL AND BASE OF THE GREEK IONIC ORDER.

- FIGURE 1. Elevation of the Greek Ionic Entablature and Corner Capital.
 FIGURE 2. Section of the Entablature.
 FIGURE 3. Side Elevation of the Corner Capital.
 FIGURE 4. Plan of the Corner Capital.
 FIGURE 5. Capital and Base of the Greek Ionic Pilaster.

The Greek Ionic orders were far from being always the same, and upon the Acropolis at Athens alone a number of examples have been found. The order given in this plate

resembles that of the Erechtheium, the grace and richness of which are remarkable.

In order to give the dimensions of the different members of mouldings, which are very delicate, the module is divided into 18 parts and each of these parts into 18 minutes.

In these orders, which were extremely rich, the frieze was almost always decorated with bas-reliefs.

PLATE L.

INTERCOLUMNIATION OF THE GREEK CORINTHIAN ORDER.

But very few examples of the Greek Corinthian order are known. That which is given in this plate is derived from the building known as the Monument of Lysicrates at Athens.

To draw the Greek Corinthian intercolumniation, the height being given, divide this dimension into 27 equal parts, one of which will be the module. Allow 5 modules for the entablature and 22 for the column. The columns should be spaced $9\frac{1}{2}$ modules from axis to axis. For detailed description of this order see Plate LI.

PLATE LI.

ENTABLATURE, CAPITAL AND BASE OF THE GREEK CORINTHIAN ORDER.

- FIGURE 1. Section of Greek Corinthian Entablature and Capital.
 FIGURE 2. Elevation of Entablature and Capital.
 FIGURE 3. Plan of Capital.
 FIGURE 4. Plan of Dentils.

This plate represents the details of the Greek Corinthian intercolumniation. It will be observed that the module is always equal to one-half the diameter of the shaft of the column at its base. The module is divided into 18 parts and each part into 18 minutes. In the plate an astragal in the shape of a row of pearls has been added to the capital, although in the Monument of Lysicrates there is a hollow at this place. This added member should probably be of metal.

PLATE LII.

STUDY OF DOORWAYS.

This plate shows in Figure 1 the entrance to the gardens of the Farnese Palace, on the Palatine in Rome, built in the rustic style by Vignola. The upper part, which has been suppressed in this plate, was not built by Vignola.

Figure 2 shows the entrance door of the Museum of the École des Beaux-Arts, Paris, of which M. Duban was the architect.

PLATE LIII.

STUDY OF DOORWAYS.

Figure 1 represents a doorway designed by Vignola for the Cancelleria Palace, Rome, but which was never executed. It will be noted that the width is equal to half the height.

The door-frame is about one-eighth of the width of the opening.

Figure 2 represents the doorway of the Palace of Caprarola, and is also by Vignola. The height is twice the width; the pilasters are eight diameters high, and the entablature is one-quarter the height of the pilasters.

PLATE LIV.

MAIN DOORWAY OF THE FARNESE PALACE, ROME.

- FIGURE 1. Elevation of the doorway.
FIGURE 2. Section.
FIGURE 3. Plan.
FIGURE 4. Detail of the cornice.

The main doorway of the Farnese Palace is given as an example of the round arched rusticated doorway. The projection of the cornice is occasioned by the stone balcony above it, but which is not shown in the plate.

PLATE LV.

STUDY OF DOORWAYS.

This plate shows the difference between an interior and exterior doorway of very similar form. Figure 1 shows a doorway in the second story of the Farnese Palace, built from the designs of Vignola.

Figure 2 shows the entrance door of the Church of St. Laurent in Damaso, after Vignola. On account of its richness this doorway harmonizes very well with the Corinthian order.

PLATE LVI.

DOORWAY OF THE PANTHEON AT ROME.

- FIGURE 1. Elevation of the Doorway.
FIGURE 2. Detail of the Cornice and of the Face of the Door-jamb or Architrave.
FIGURE 3. Section of the Door-jamb, or Architrave.

It has been established that the portico which precedes the rotunda of the Pantheon, and of which this doorway with its folding bronze doors is a part, was built in the time of Agrippa.

PLATE LVII.

STUDY OF WINDOWS.

In Figure 1 is represented the window of the lower story of the Palace of Caprarola. The height is double the width, and the frame, or architrave, is $\frac{2}{3}$ the width of the

opening. In Figure 2 is given an example of a window of the rustic order from the first story of the entrance building of the Villa of Pope Julius II. at Rome. The height is here also double the width.

PLATE LVIII.

DRAWING OF THE SHADOWS OF THE TUSCAN AND DORIC BASES.

- FIGURE 1. Vertical and Horizontal Projections of the Tuscan Base.
FIGURE 2. Vertical and Horizontal Projections of the Doric Base.

In order to find the shadows on the Tuscan and Doric bases cut the bases by vertical planes parallel to the direction of the ray of light; curves of section will thus be obtained, by the aid of which draw, point by point, the limits of the shadow and light, locating these points by tangents at 45° , which should be prolonged until they meet the curves of section.

In order to obtain these sections by means of the vertical planes at 45° it will be necessary, for the curved surfaces, to consider the intersection of these vertical planes at 45° with the sections of the same surfaces by horizontal planes. An examination of the plate, however, will make the method of drawing clear.

NOTE. — There are various methods in use for casting shadows on architectural drawings. That used for capitals and bases in the following plates is known as the "slicing method." It is desirable that the student should thoroughly understand and be familiar with this process, although in practice shorter and more practicable methods are used, which cannot be explained here.

The most satisfactory text-book on Shades and Shadows is that of Professor Pillet, translated by Prof. Julian Millard.

PLATE LIX.

DRAWING OF THE SHADOW OF THE TUSCAN CAPITAL.

To obtain the shadows on the capital the same process (the "slicing method") is employed as for the base, that is to say, by making use of the sections obtained by a series of vertical planes cutting the capital parallel with the ray of light. Besides the shadows on the capital there are also given the shadows cast by the capital upon a vertical plane passing through the axis.

PLATE LX.

SHADOW OF THE DORIC CAPITAL.

The same process is here used as for the Tuscan capital.

The capital surmounted by an architrave will cast a shadow such as that shown in this plate, upon a vertical plane parallel to the picture, and passing through the axis of the column.

PLATE LXI.

STUDY OF THE SHADOW OF THE CAPITAL OF THE IONIC ORDER.

Upon this plate are indicated the shadows of the Ionic capital seen from the front, and the shadows cast by the capital upon a vertical plane parallel to the picture plane and passing through the axis of the column. The method employed to obtain the different points of the shadow is always the same.

PLATE LXII.

STUDY OF THE SHADOW OF THE BASE AND OF THE CAPITAL OF THE IONIC ORDER SEEN IN PROFILE.

In the capital, as the edge of the cast shadow upon the shaft is made up of the expression of the listels of the volute and of the cincture, as well as of the line of shade on the cushion, it was necessary to draw separately the curves of the listel to obtain in plan the horizontal projections, and in the elevation the vertical projections of their principal points, and also the shade of the cushion as is indicated by the figures.*

For the base, it is necessary again to employ the method of vertical cuts, as A B, upon each of which the lines which are tangent to the base and parallel to the direction of the light give the limits of the shades upon the convex surfaces, while the secant lines give those of the cast shadows on the concave surfaces.

*The student will be able to follow this process if it is remembered that it is first necessary to determine the dividing line between light and shade upon the listels, cushion and cincture, shown in elevation in light and shade, and in the plan by hatching. To establish this line of division the profile of the listel is drawn, in dotted lines, at the right of the elevation, and that of the cincture of the cushion at the left. The remaining steps are obvious.

PLATE LXIII.

STUDY OF THE SHADOW OF THE CORINTHIAN CAPITAL.

FIGURE 1. Shadow of the Abacus and the Vase of the Corinthian Capital.

FIGURE 2. Shadow of the whole Corinthian Capital.

The shadow in Figure 1 is obtained by making a series of sections by means of vertical planes parallel to the direction of the light. In Figure 2 it is necessary to study separately the shadow of each of the ornaments of the capital in order to obtain an exact knowledge of the general shadow. Only the final result is here given.

PLATE LXIV.

DRAWING OF THE SHADOWS OF MODILLIONS, AND OF A PEDIMENT.

FIGURE 1. Study of the Cast Shadows of Pediment with Modillions.

FIGURE 2. Study of the Shadows of a Cornice of the Corinthian Order.

To determine the shadows cast by the cornice, draw from above the lines A C and B D, next the horizontal lines C E', D G', next by bringing down the points E, F, G, by means of lines at 45° the points E' F' G' will be obtained.

To draw the shadow of the pediment, first locate the lines M' P, O' N', R S, X Y, by making sections by means of vertical planes parallel to the ray of light, then locate successively the limits of the shadows, proceeding as with the cornice.

For Figure 2 the process is the same; it is only necessary to find a greater number of points to obtain the curves.

PLATE LXV.

SHADOWS OF THE TUSCAN PORTICO WITH PEDESTAL.

To find the cast shadows of this portico draw lines at 45° from all points in the plan which can cast shadows, to the planes upon which the shadows should be cast. From these points erect perpendiculars which may be intersected by lines at 45° from the corresponding points in the elevation. These intersections give the successive points of the desired shadows. For the details of the shadows cast by the capital directions are given on Plate 59.

PLATE LXVI.

STUDY OF THE SHADOWS OF THE IONIC ARCADE WITH PEDESTAL.

The shadows of this portico are determined by the same process as that employed in the preceding plates. The shadow of a niche is shown in order to explain the method by which it is drawn.*

The shadow of the niche falls upon two kinds of surfaces, — the cylindrical surface, and the spherical surface, forming the head of the niche.

To obtain that part of the shadow which falls upon the spherical surface of the niche draw through the centre O of the circle which forms the top of the niche a line at 45° to the horizontal, cutting the circle at the two points A and B. Erect a perpendicular to this line at O, cutting a line I H, which is made parallel to A B, in the point C, from which as a centre describe a semi-circle, of the same diameter as the niche. Then from the point D as centre and with the radius D E describe an arc cutting the line F D G, which is also parallel to A B, in the point F. At the point F erect a perpendicular to F D, cutting the line I H in the point I; then join I and D with a straight line which will be the diagonal of a cube, the side of which is equal to the radius of the niche, and at the same time will be the direction of

*The method given at the foot of Plate LXVI being incorrect, a method is here given which has been adapted to the diagram shown in the plate.

the ray of light in the revolved plane. Through the point E draw a line parallel to the line I D until it intersects the semi-circle at the point N, and join the points N and C by a straight line. This line will be the edge of the shadow on the spherical surface of the niche as it shows on the revolved plane. To obtain this line in elevation take several points such as a, b, c, through which draw lines at 45° parallel to A B, and perpendiculars to these lines, cutting the line I H in the points a' b' c'. From these points draw lines parallel to the ray of light I D cutting the line of shadow N C in the points a'' b'' c'' which will be the representations in this revolved plane of the shadows cast by the points a b c on the sphere of the niche. To obtain these points in elevation draw through the points a'' b'' c'' parallels to O C until they meet the lines at 45° passing through the points a, b, c, of the elevation. The intersections of these lines will give the points through which a curve can be drawn which will give the portion of the shadow on the spherical surface of the niche.

To obtain the shadow on the cylindrical surface of the niche take other points d, e, f, through which also draw lines at 45° , and project these points upon the line P Q of the plan in the points d' e' f'. Through these projected points draw parallels to A' B' until they cut the circle representing in plan the depth of the niche. Through the points thus obtained draw perpendiculars which will cut the lines at 45° drawn from the corresponding points in elevation. These intersections give the last points of the second part of the curve of the shadow.

That part of the shadow which falls across the band of mouldings within the niche is found by a method similar to the one employed in finding the shadow on the cylindrical surface, since the surfaces of these mouldings, on which the shadow is visible, are also cylindrical.

* These letters have been omitted in the plate, but the points can easily be identified between P and A in the plan.

PLATE LXVII.

WOODEN FLOORS.

The name floor is given to the horizontal carpentry construction used to separate the different stories of a structure and to support the flooring of boards or parquetry. Floors are made up of three parts: first, the ceiling, second, the timber work, proper, and third the pavement or parquetry. When the floor is of small size joists only are used, spaced, as a rule, 33 c. m. on centres. When the floor is larger, the joists are carried by stronger timbers, called girders. Girders should be inserted at least 25 c. m. in the wall. The dimensions of timbers are proportioned to the load they are required to carry. To insure the proper preservation of wood it should be isolated, as far as possible, from the masonry, and closed in as little as possible.

Two examples of floor construction are here given with the principal arrangements commonly met with.

- A. Hearth of the fireplace.
- B. Header.
- C. Trimmer.
- D. Joist.
- E. Trimmers.
- H. Joist.
- M. Girder with joists on top.
- N. Girder with joists hung.
- P. Iron stirrup.

PLATE LXVIII.

EXTERIOR TIMBER FRAMING.

Timber work, though less strong, is used instead of masonry. Interior timber framing does not differ from that used for exteriors except that the former is thinner and lighter. For timber framing 4. metres in height the corner posts are made 25 c. m. section, the studs next openings 15 c. m., and studs and filling timbers from 10 to 12 c. m. When timber work is built three or four stories high the corner posts are made of from 25 to 30 c. m. section, and the sills and plates and girts from 20 to 25 c. m.

The spaces between the timbers are filled with boards or brickwork, if the timbers are intended to show, and by lath and plaster work if they are to be covered.

It is preferable to allow the construction to show.

- | | |
|--------------------|--------------------|
| a. Sill and Plate. | j. Filling in. |
| b. Corner Post. | m. Plate. |
| c. Window Studs. | n. Studs. |
| d. Brace. | p. Crossed braces. |
| f. Trusses. | r. Joists. |
| g. Header. | s. Underpinning. |
| h. Sill-piece. | |

PLATE LXIX.

TRUSSES FOR STRAIGHT WOODEN ROOFS.

The name roof is given to the top part of a building upon which is applied the covering intended to protect it from the weather. To carry this covering it is necessary at intervals of from 4 to 5 m. to use trusses constructed of wood or iron. The disposition of these trusses varies according to the necessities of construction, the materials employed for the roof covering, and the climate. Three examples for straight roofs are here given.

FIGURE 1.

- | | |
|---------------|------------------|
| a. Tie beams. | f. Purlin. |
| b. King post. | g. Ridge Purlin. |
| c. Principal. | h. Jack rafter. |
| d. Strut. | i. Plate. |
| e. Strut. | l. Foot rafter. |

FIGURE 3.

- | | |
|---------------|------------------|
| a. Tie beam. | h. Strut. |
| b. Brace. | i. Purlin. |
| c. Tie beam. | k. Ridge Purlin. |
| d. King post. | l. Plate. |
| e. Principal. | m. Tie. |
| f. Brace. | n. Jack rafter. |
| g. Strut. | o. Foot rafter. |

PLATE LXX.

PRINCIPAL TYPES OF MANSARD ROOFS.

FIGURES 1, 2 and 3. Different Mansard Roofs with Lower Tie Beam.
FIGURE 4. Mansard Roof without Lower Tie Beam.

The trusses of a mansard roof are spaced as are those of other roofs, generally from 4 to 5 m. apart. When the types of roof shown in Figs. 1, 2, 3, are used for dwelling houses the braces f are left out and may be replaced by iron brackets or angles. The tie beam a then receives a series of timbers 0.33 on centres and 0.17 x 0.07, upon which are nailed the lathes for plastering.

- | | |
|------------------------|----------------------|
| a. Tie beam. | g. Struts. |
| b. Strut. | i. Angle plate. |
| c. Lower tie beam. | k. Ridge purlin. |
| d. King post. | l. Wall plate. |
| e. Principal of truss. | m. Foot rafter. |
| f. Braces. | n. Purlin and block. |

PLATE LXXI.

HIP ROOFS.

When roofs do not end in a gable a sloping framework is used instead. These triangular portions of roof placed at the end of a roof are called hips. If the walls are at right angles the hip is called *droite* (straight). If the walls are not at right angles the hip is called *biaise* (slanting).

- | | |
|----------------|-----------------------|
| A. Hip roof. | O. Hip rafter. |
| B. Pitch roof. | L. Jack rafters. |
| P. Truss. | R. Jack rafters. |
| Q. Half truss. | T. Tie beam of truss. |

PLATE LXXII.

JOINERY, STUDY OF DOORS AND WINDOWS.

- FIGURE 1. Elevation of Window from the Inside.
 FIGURE 2. Section on the line AB.
 FIGURE 3. Section on the line CD.
 FIGURE 4. Section on the line HG.
 FIGURE 5. Elevation of an Interior Door.
 FIGURE 6. Section on the line EF.
 FIGURE 7. Section on the line LM.

This plate shows, in general and in detail, interior doors and simple windows. Wood, being subject to expansion and contraction and warping, the problem to be solved by the joiner is to overcome these inconveniences. Rails and stiles should be made of sufficient strength to resist warping, and reinforced by pieces of iron such as the plates shown at g in Fig. 1. To avoid swelling and shrinking, pieces of small dimensions, and especially so across the grain, should be used. Woodwork should then be put together in such a way that the variations of the wood may take place without showing on the surface. The details of this plate will make clear the methods to be adopted for this purpose.

Exterior doors differ in no way from interior ones except in being made stronger.

- | | |
|-----------------------------|--------------------------|
| a. Jamb. | m. Jamb. |
| a'. Head and sill. | m'. Door-head. |
| b. Side rails. | n. Architrave. |
| b'. Meeting rails. | o. Stiles. |
| c. Upper rail. | o'. Stiles. |
| c'. Lower rail with drip. | p. Panels. |
| f. Muntios. | p. Panel mouldings. |
| g. Iron braces. | s. Lock. |
| h. Hinges. | r. Top and bottom bolts. |
| k. Double bolt with levers. | b. Hinge. |

PLATE LXXIII.

BARREL VAULTS AND CLOISTERED VAULTS.

- FIGURE 1. Barrel Vault.
 FIGURE 2. Cloistered Vault.
 FIGURE 3. Cloistered Vault with open top.

Figure 1 shows a straight barrel vault and the stone joints. Figures 2 and 3 show two cloistered vaults, that is,

vaults formed by the intersection of two barrel vaults. These two barrel vaults may be similar (of equal section) which simplifies the arrangement. When it is desired to admit light from above, the arrangement shown in Figure 3 is used.

PLATE LXXIV.

STUDY OF DIFFERENT GROINED VAULTS.

- FIGURE 1. Oblong Groined Vault.
 FIGURE 2. Vault with Double Groins and Pendentives.
 FIGURE 3. Vault with Double Groins and Cut-off Sides.

Groined vaults are formed by the intersection of one or more barrel vaults. More examples are given here in order to show some of the varieties of this kind of vault.

PLATE LXXV.

VAULTS UPON PENDENTIVES.

- FIGURE 1. Vaults upon Pendentives with Trumpets, Lunettes and Arches.
 FIGURE 2. Vault upon Pendentives with Lunettes.

The domical vault with pendentives is obtained by cutting a sphere by four vertical planes. When it is desired to allow the light to enter from above the sphere is cut by a fifth plane, this time horizontally.

Two types of the construction of this kind of vault are given. Reference should be made to special treatises upon stereotomy for further details.

PLATE LXXVI.

STUDY OF CAISSONS.

- FIGURES 1 AND 4. — Section upon a plane parallel to the elements of the Barrel Vault.
 FIGURES 2 AND 5. — Section upon a plane perpendicular to the elements of the Barrel Vault.
 FIGURES 3 AND 6. — Development of a portion of the Vault.
 FIGURE 7. — Section of a Dome with Caissons.
 FIGURE 8. — Plan of a quarter of the Dome and Caissons.
 FIGURE 9. — Development of a segment for the purpose of drawing the Caissons.

Caissons are hollow compartments formed upon the surface of a vault in order to diminish the weight, and at the same time retain the desired strength. Caissons give an opportunity for enrichment, either by their form or by applied ornament, appropriate to the building in which they are employed. Several examples are given here.

To draw in projection the caissons of a barrel vault first develop a portion of the vault sufficient to show all the details of the decoration, then project all the parts by means of elements of the surface.

The surface of a domical vault cannot be exactly developed. It is necessary, therefore, to work by approximation, by developing a segment, which should be taken as small as possible.

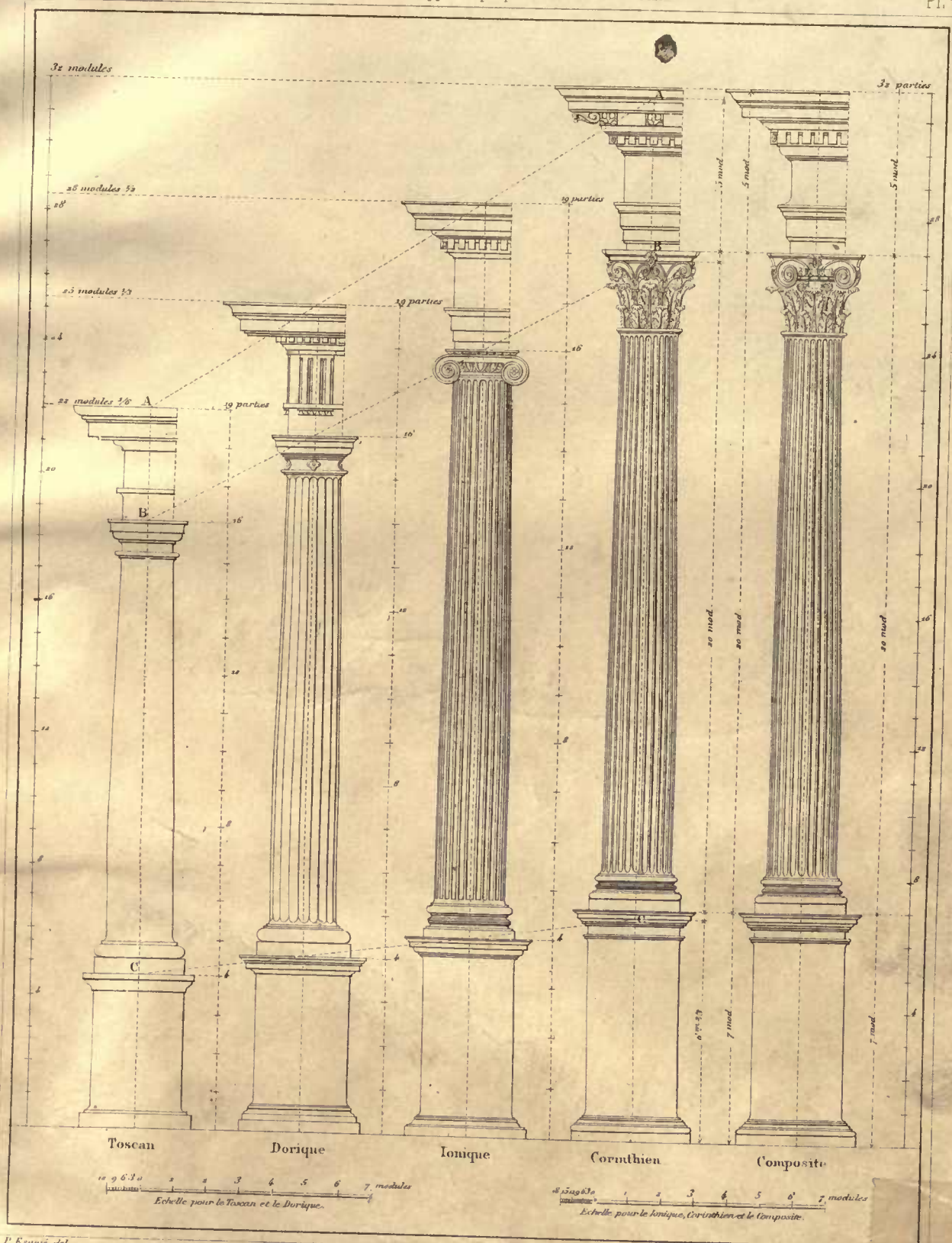
GLOSSARY

Abaque. Abacus.	Cincture. Cincture.	Dez. Die.
Aisselier. Brace.	Clef. Key, or key-stone.	Diamètre de la colonne. Diameter of the column.
Annelet. Annulet, or cincture.	Colonne. Column.	Dorique. Doric.
Annelet, orle ou cincture. Annulet, or cincture, or fillet.	Comble. Roof.	Doucine. Cyma recta.
Antes. Antæ.	Comble droit. Straight roof.	Echarpe. Brace.
Appui. Sill-piece.	Composite. Composite.	Elevation. Elevation.
Arbalétrier. Principal.	Congé. Congé, or apophyge.	Elevation principale. Principal elevation.
Arcade. An opening arranged in masonry, and composed of an arch supported either on columns or on piers.	Congé inférieure. Lower congé.	
Architrave. Architrave.	Contrefiche. Strut.	
Archivolte. Archivolt.	Coque des oves. Shell of the eggs.	Empanons. Jack rafters.
Arctier. Hip rafter.	Corinthien. Corinthian.	Entablement. Entablature.
Assises. Courses, of stonework.	Corniche. Cornice.	Entrait. Lower tie beam.
Âtre de la cheminée. Hearth of the fireplace.	Corniche de la porte. Cornice of the doorway.	Entr'axe. Distance between one axis and another.
Axe. Axis.	Corniche du piédestal. Cornice of the pedestal.	Entrecolonnement. Intercolumniation.
Axe du chapiteau. Axis of the capital.	Côte. Side, meaning in this case side elevation.	Équerre en fer. Iron brace.
Baguette. Baguette, or astragal.	Côte de la cannelure. Side of the flute, referring to the listel between the flutes.	Étrier en fer. Iron stirrup.
Balustrade. Balustrade.	Coupe. Section.	Eschelle. Scale.
Base. Base.	Coupe larmes. Drip, or drip moulding.	Eschelle de la plan et de la coupe. Scale of the plan and of the section.
Base de la colonne. Base of the column.	Coupole. Dome.	Eschelle des, etc. Scale for, etc.
Bâti de dormant. Jamb, of door or window.	Coussinet. Cushion.	Eschelle du detail. Scale for the detail.
Baton. Astragal, or narrow band.	Coyau. Foot rafter.	Étage. Story (of a building).
Baton ou baguette. Astragal.	Crémone. Double bolt, with levers.	Face. Fascia.
Battants de noix contre dormant. Side rails.	Croix de St. André. Cross bracing in the form of the letter X.	Face de l'abaque. Fascia of the abacus.
Battants meneaux. Meeting rails.	Croupe. Hip roof.	Face de l'architrave. Fascia of the architrave.
Blochet. Tie.	Croupe biaise. A hip roof upon a building with walls not at right angles.	Face de l'archivolte. Fascia of the archivolt.
Cadres de panneaux. Panel mouldings.	Croupe droite. A hip roof upon a building with walls at right angles.	Face de l'imposte. Fascia of the impost.
Caissons. Caissons.	Cymaise. Cymatium.	Face du tailloir. Fascia of the abacus.
Canaux. Channels. The channels of the triglyph.	Dards. Darts.	Faitage. Ridge purlin.
Cannelure. Flute.	D'axe en axe. From axis to axis.	Faux chevêtres. Joists.
Cannelure demi-circulaire. Semi-circular flute.	Dé ou dez. Die.	Fenêtres. Windows.
Cathète. Cathetus.	Dé ou tronc. Die.	Ferme. A roof-truss.
Caulicole. Cauliculus.	Décharges. Trusses.	Feuille. Leaf.
Cavet. Cavetto.	Demi ferme. Half truss.	Feuille des caulicoles. Leaf of the cauliculi.
Chambranle. Door-jamb, or architrave. Window-jamb, or architrave.	Denticules. Dentils.	Filet. Fillet.
Chapiteau. Capital.	Détail de la corniche. Detail of the cornice.	Filet ou anneau. Fillet, or ring.
Chapiteau des triglyphes. Capital of the triglyphs.	Détails des gouttes dans l'architrave sous le triglyphe. Details of the guttæ, or drops, in the architrave under the triglyph.	Fleuron. Rose, or flower.
Cheminée. Fireplace.	Détail d'une goutte du soffite. Detail of a drop of the soffit.	Frise. Frieze.
Chevêtres. Trimmers.		Frise de la porte. Frieze of the doorway.
Chevron. Jack rafter.		Fronton. Pediment.
Chevrons. Jack rafters.		Fût ou vif de la colonne. Shaft of the column.
		Galbe. Entasis. The swelling of the shaft of a column.

- Génératrices.** Generatrices.
Gorgerin. Neck, or necking.
Gorgerin ou frise. Neck, or necking, of the shaft.
Gousses. Pods.
Goutte. Drop.
Goutte carrée. Square drop.
Goutte droite. Straight drop.
Goutte rampante. Sloping drop.
Goutte ronde. Round drop.
Gouttes. Drops, or guttæ.
Gouttière. Gutter.
Grande feuille. Large leaf.
Grande salle. Large hall. In this case, applied to the cella of the Roman temple.
Guettes. Braces.
Hauteur de, or hauteur du, etc. Height of, etc.
Hauteur de l'arcade. Height of the arcade.
Hauteur de la colonne. Height of the column.
Imposte. Impost.
Ionique. Ionic.
Jamb de force. Brace.
Jambette. Strut.
Jet d'eau. Drip.
Lambourde. Summer attached to girder.
Largeur de, or largeur du, etc. Width of, etc.
Largeur de l'arcade. Width of the arcade.
Larmier. Corona.
Ligné. Line.
Ligne droite. Straight line.
Ligne spirale. Spiral line.
Lincoir. Trimmer.
Linteau. Lintel.
Listeau. Listels. Plural of listel.
Listel de l'abaque. Listel of the abacus.
Listel, ou cincture. Listel, or cincture.
Longs pans. Slope of the roof.
Marches. Steps.
Menuiserie. Joinery.
Métope. Metope.
Mètres. Metres. Equal to 39.37 inches.
Modillons. Modillions.
Module. Module. An arbitrary unit of measure.
Montants. Stiles.
Moultures. Mouldings.
Moultures de chambranle. Mouldings of the architrave (of the door or window).
- Mutule.** Mutule.
Mutule avec gouttes en dessous. Mutule with drops beneath.
Nu de l'architrave. Surface, or plane, of the architrave.
Nu du fût. Face of the shaft.
Nu du vase. Face of the vase.
Œil de la volute. Eye of the volute.
Ombre. Shadow.
Ombre portée. Cast shadow, as distinguished from shade.
Ombre propre. Shade, as distinguished from cast shadow.
Ove. Ovolo.
Oves. Eggs.
Pan de bois. Framed timber work.
Panne de lierne. Purlin.
Panneaux. Panels.
Pannes. Purlins.
Parties. Parts, the divisions of a module.
Paumelle. Hinge.
Pendentif. Pendentive.
Petite feuille. Small leaf.
Petits bois. Muntins.
Piédestal. Pedestal.
Plan. Used either for plan, as in architecture, or plane, as in geometry.
Plancher. Floor.
Plinthe. Plinth.
Plinthe ou socle de la base. Plinth of the base.
Poinçon. King post.
Porte. Doorway.
Portique. Portico.
Poteau. Post.
Poteaux. Posts.
Poteaux corniers. Corner posts.
Poteaux d'huissierie. Window studs.
Poutre. Girder.
Poutre avec lambourde. Girder with joists hung.
Poutre portant solives. Girder carrying floor joists.
Projection horizontale. Horizontal projection.
Projection verticale. Vertical projection.
Quart de rond. Quarter round.
Quart de rond, ou ove. Quarter round, or ovolo.
Reglet. Reglet, or listel.
Reglet, ou listel. Reglet, or listel.
Remplissage. Filling in.
Renflé. Having entasis.
Rez-de-chaussée. First story, ground floor.
- Rosace.** Rose, or flower.
Rose. Rose.
Rose, ou fleuron. Rose, or flower.
Sablière. Plate.
Sablières. Plates.
Sablières de chambrée. Plate.
Salle. Hall.
Scotie. Scotia.
Scotie inférieure. Lower scotia.
Scotie supérieure. Upper scotia.
Serrure. Lock.
Socle. Socle.
Socle de la base. Socle of the base.
Socle maçonnerie. Base of masonry, underpinning.
Socle ou base du piédestal. Base of the pedestal.
Soffite. Soffit.
Solive. Joist.
Solives. Joists.
Solives d'enchevêtrement. Headers.
Tailloir. Abacus.
Talon. Cyma reversa.
Talon renversé. Reversed cyma-reversa.
Tirant. Tie-beam.
Tore. Torus.
Torse. Twisted.
Toscan. Tuscan.
Tournisse. Stud.
Tracé. Drawing, or representation.
Traverse de dormant. The head, and the sill of a door.
Traverse du haut. Upper rail.
Traverses. Stiles.
Triglyphe. Triglyph.
Triglyphes avec canaux. Triglyphs with channels.
Tronc. Shaft.
Tympan. Tympanum.
Tympan du fronton. Tympanum of the pediment.
Vase. Vase.
Verrou. Bolt.
Volute. Volute.
Voûte. Vault.
Voûte d'arête. Groined vault.
Voûte d'arête barlongue. Oblong groined vault.
Voûte en arc de cloître. Cloistered vault.
Voûte en arc de cloître ouverte par le haut. Cloistered vault open at the top.
Voûte en berceau. Barrel vault.
Voûte sur pendentifs. Vault upon pendentives.

PARALLELE EXPLICATIF DES CINQ ORDRES D'ARCHITECTURE D'APRÈS VIGNOLE
et de leurs rapports proportionnels entre eux

F. MATTHESIUS, J.
PL. I



P. Esquisse del.

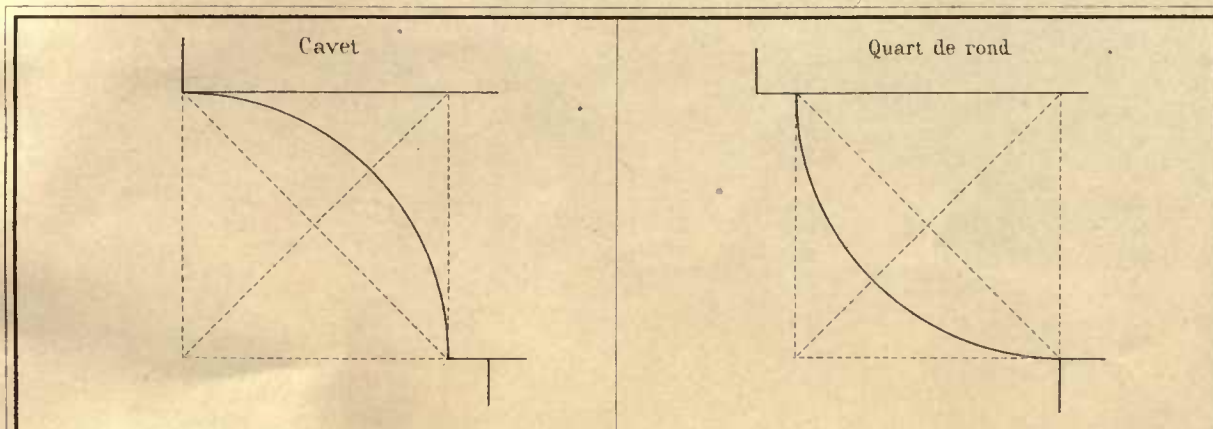
CHARLES SCHMID, ÉDITEUR, 51 Rue des Ecoles. Paris.

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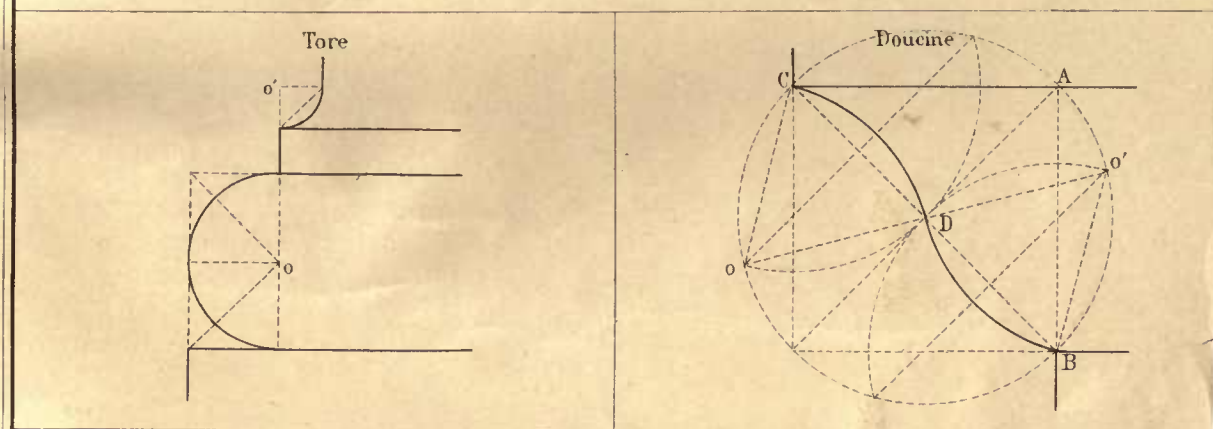
Un ordre est l'ensemble architectural formé par les éléments nécessaires pour soutenir des parties pleines au dessus de parties vides. Quand il est complet, l'ordre comporte un entablement, une Colonne et un piédestal. Le piédestal n'est pas indispensable.

Les proportions relatives de ces éléments devant varier suivant la nature des matériaux mis en œuvre et le degré de richesse que l'on désire obtenir, on a ramené les divers systèmes à cinq types que l'on nomme : le Toscan, le Dorique, l'Ionique, le Corinthien et le Composite. Les proportions que nous donnons d'après Vignole n'ont rien d'absolu, mais on ne devra pas perdre de vue que ce sont des moyennes et qu'en s'écartant trop et sans raison on s'expose à commettre de véritables erreurs.

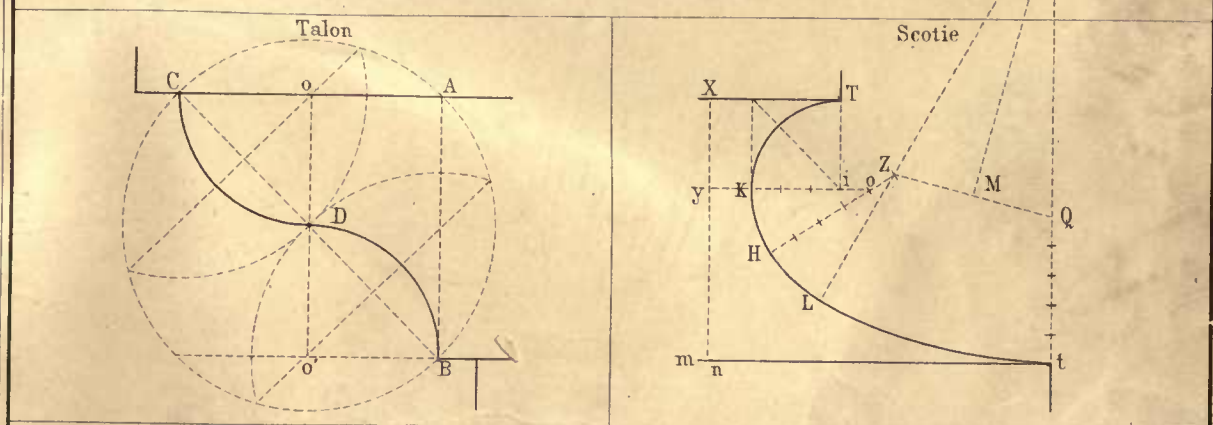
Cette planche offre le parallèle des cinq ordres d'architecture donnés par Vignole, nous faisons voir par la ligne de division de hauteur en 32 parties cette partie étant considérée comme le module. La proportion que les ordres ont entr'eux : le Toscan, le Dorique et l'Ionique ont les mêmes proportions relatives, comme on le voit par les lignes AA - BB - CC, c'est à dire que pour ces trois ordres le piédestal a le 1/3 de la colonne et l'entablement le 1/4, il n'y a que pour les ordres Corinthien et Composite que Vignole a cru devoir changer cette proportion, tout en conservant à l'entablement le 1/4 de la hauteur de la colonne, il a exhaussé le piédestal de 1/3 de module afin de rendre ces deux ordres encore plus élégants et qui fût que ce piédestal au lieu d'avoir 6 m. 33 de hauteur comme il conviendrait en suivant la même proportion que celle indiquée pour les trois premiers ordres, a 5 1/3 de module de plus ou 7 modules en tout. Le module se divise en 12 parties pour les deux premiers ordres, et en 18 parties pour les trois derniers.



Le tracé des droites et des circonférences tangentes est indispensable pour opérer ce que l'on appelle **Raccordement**. Cette opération consiste à lier les lignes les unes aux autres de manière à ne former entre elles aucun Jarret. Les raccords s'emploient en architecture dans une foule de cas, et notamment dans le tracé des moulures. Les moulures se divisent en simples et composées. Les principales moulures sont : le Cavet, le Quart de rond et la Tore. Les moulures composées : la Doucine, le Talon et la Scotie. Le cavet est un quart de cercle rentrant, dont la saillie égale la hauteur. L'inspection des 3 premières figures suffira pour en comprendre le tracé.

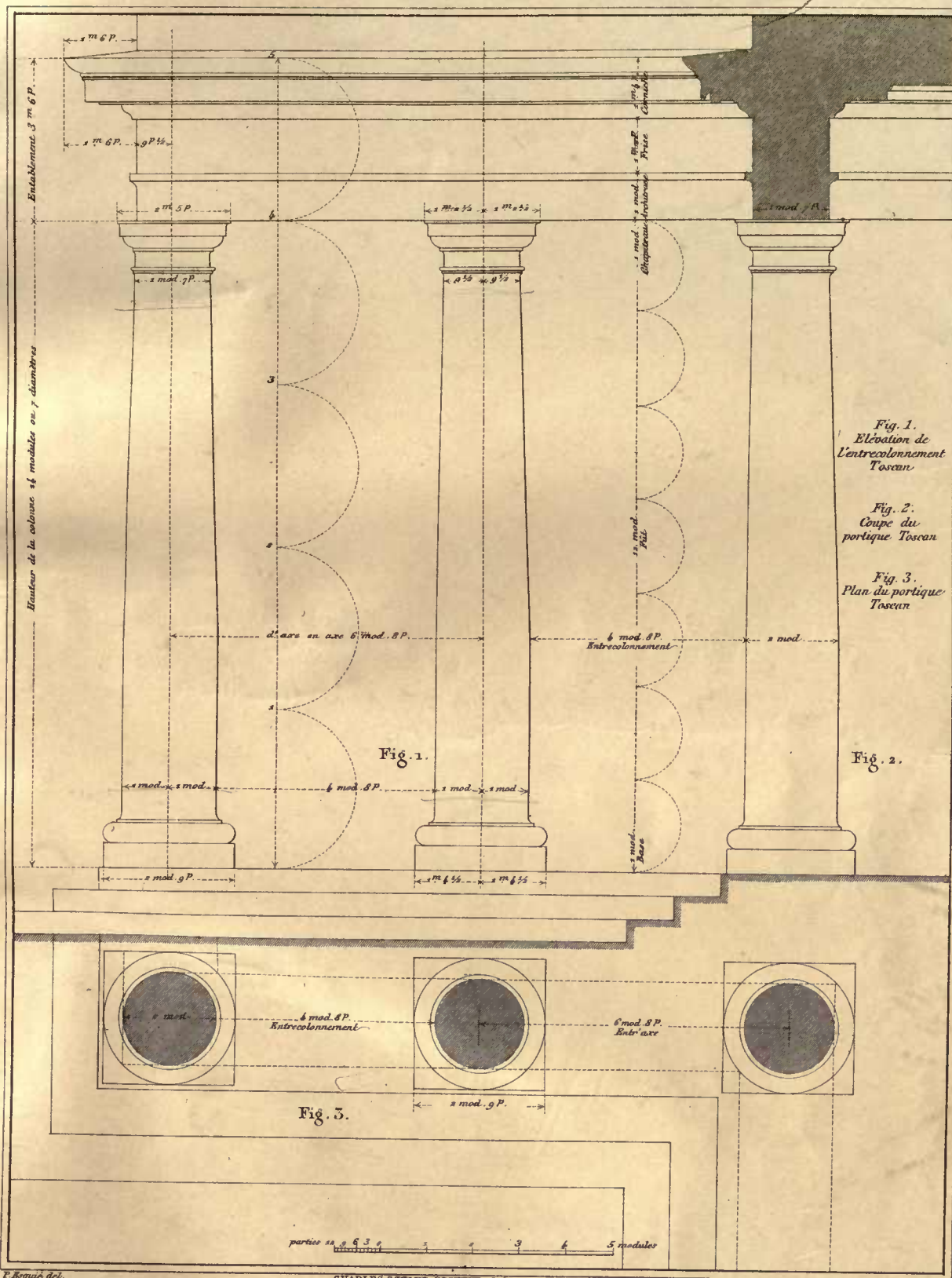


La Doucine ou Gueule droite est une moulure sinieuse dont la partie supérieure est concave et la saillie égale à la hauteur. Voici son tracé : la saillie AC étant prise égale à la hauteur AB on joint BC par une droite qu'on divise en deux parties égales au point D. Sur les côtés DB, DC on construit l'un en dedans, l'autre en dehors, deux triangles équilatéraux qui déterminent les centres O O' des arcs de cercle CDB qui forment la doucine.



Le Talon est une moulure formée par deux arcs de cercle raccordés dont l'inspection de la figure explique le tracé.

La Scotie est une moulure creuse placée ordinairement entre deux portées verticales, tracé : les parallèles m t, X T et leurs points respectifs T t étant donnés par les points de tangence T t et par n quelconque pris sur m t élevés les perpendiculaires t O', T i, n X. Prenex Xy = $\frac{1}{3}$ Xn et par y menex yi parallèle à m t qui déterminera le point par son intersection avec T i décrivez du point i le quart de cercle T K, portez i O = $\frac{1}{3}$ de K i, du point O décrivez la KH = $\frac{1}{3}$ arc TK portez ensuite O Z = $\frac{1}{3}$ de OH portez H Z = t Q joignez Z et Q par une droite Z Q et élevez une perpendiculaire M O au milieu de cette droite qui déterminera O', le point Z sera le centre de H L et O' de t.



P. Requès del.

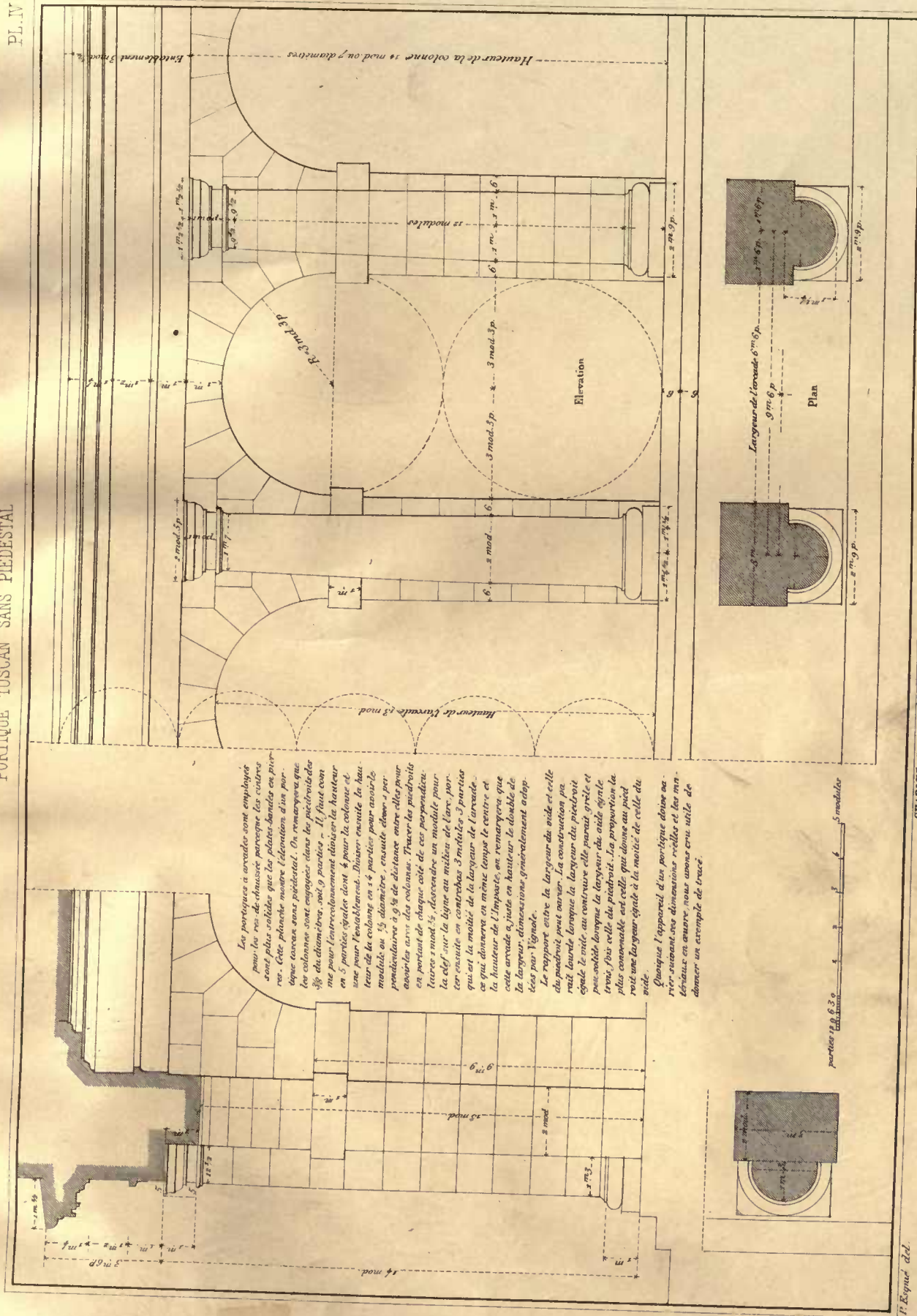
CHARLES SCHMID EDITEUR, 51, Rue des Ecoles, Paris.

Straumann sc.

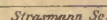
La distance d'une colonne à l'autre s'appelle l'Entrecolonnement. L'entrecolonnement ne doit jamais être assez grand pour que la solidité réelle ou apparente ait à souffrir, ni assez étroit pour empêcher l'accès de la lumière ou le passage des hommes dans une colonnade, les entrecolonnements doivent être égaux à moins qu'il n'y ait nécessité d'ouvrir un grand passage au milieu pour une entrée principale.

Vignole n'ayant rien trouvé dans les antiquités qui puisse servir de type à l'ordre toscan, s'est conformé aux règles de Vitruve où il dit que la hauteur de la colonne est de sept fois son diamètre, chapiteau et base compris ou 14 modules.

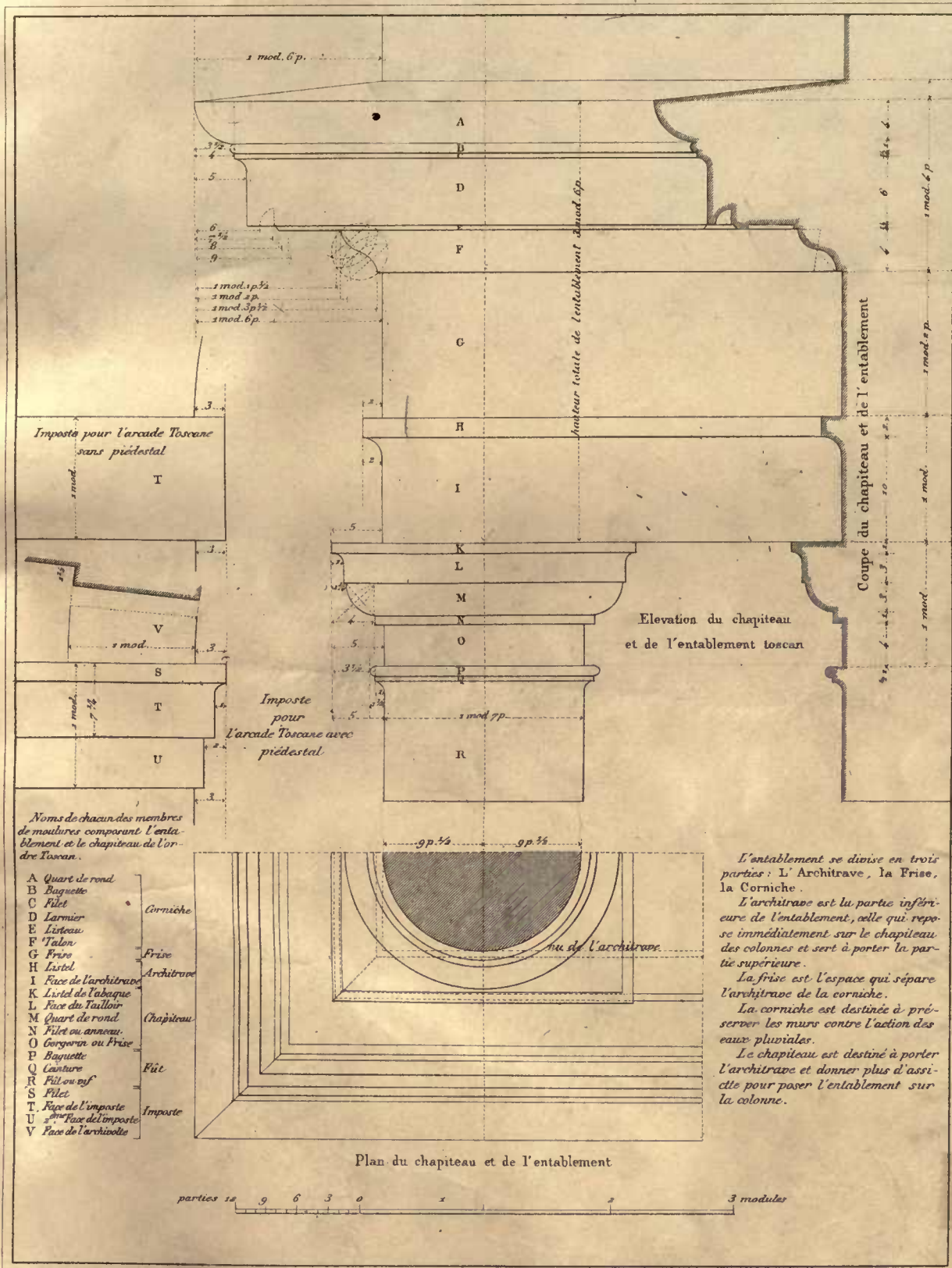
Pour dessiner un entrecolonnement Toscan il faut diviser la hauteur totale en 5 parties, la partie supérieure sera pour l'entablement, et les quatre autres parties seront pour la colonne, on divisera ces quatre parties en 14 et le 14 sera la longueur du module, on tracera ensuite après avoir fait son échelle deux lignes perpendiculaires distantes entre elles de 6 modules 2/3, elles seront les axes des deux colonnes, en partant un module pour la base et un autre pour le chapiteau, il restera 12 mod pour la fût qui est cylindrique jusqu'au tiers de sa hauteur, et qui diminue progressivement ensuite jusqu'au dessous de l'astragale où il n'a plus que 12 mod 7 parties. Nous donnerons plus tard la diminution des colonnes avec l'indication de leur tracé.







Imp R Engelmann, Paris



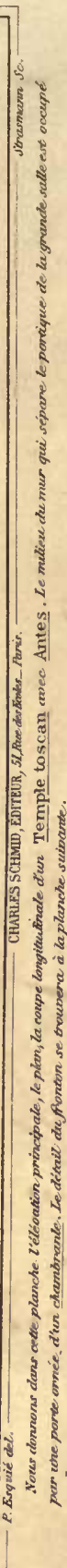
P. Esquis del.

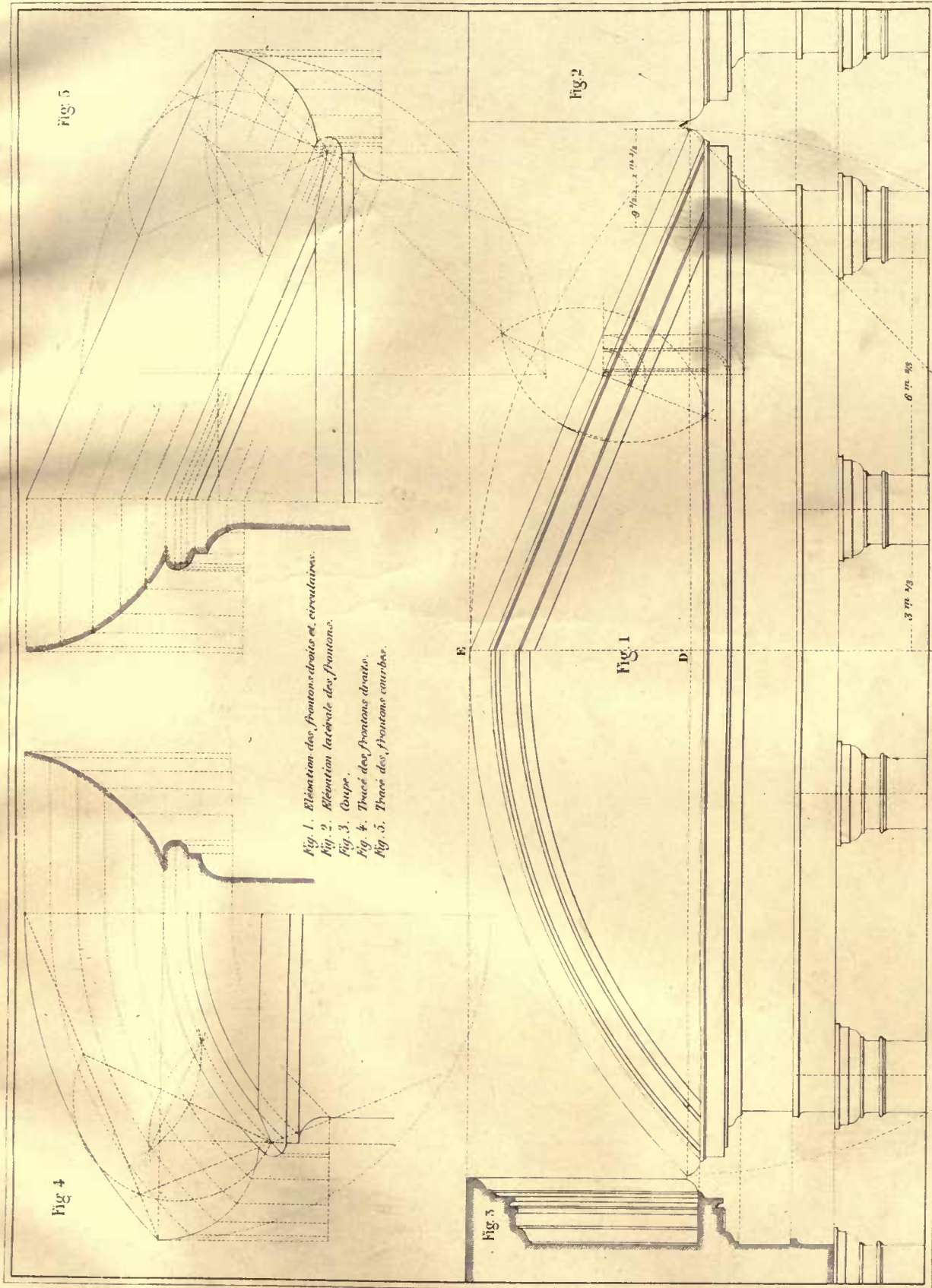
CHARLES SCHMID, EDITEUR, 51, Rue des Ecoles, Paris.

Strumann, Sc.

L'entablement toscan a le $\frac{1}{2}$ de la hauteur de la colonne ce qui lui donne par conséquent 3 modules $\frac{1}{2}$ dont 1 module pour l'architrave, 1 module 2 parties pour la frise et le reste pour la corniche, on voit dans la coupe de cette corniche l'indication du remplissage du larmier contre l'écoulement des eaux et par ce moyen les empêcher de couler sur les autres parties de l'entablement. Le chapiteau a de hauteur 1 module la diminution du fût de la colonne est de cinq parties sous l'astragale, ou 5 parties $\frac{1}{2}$ de chaque côté. — Au dessous se trouve indiqué le plan du chapiteau et de l'entablement toscan, cette indication servant à bien faire comprendre le retour d'angle de la corniche.

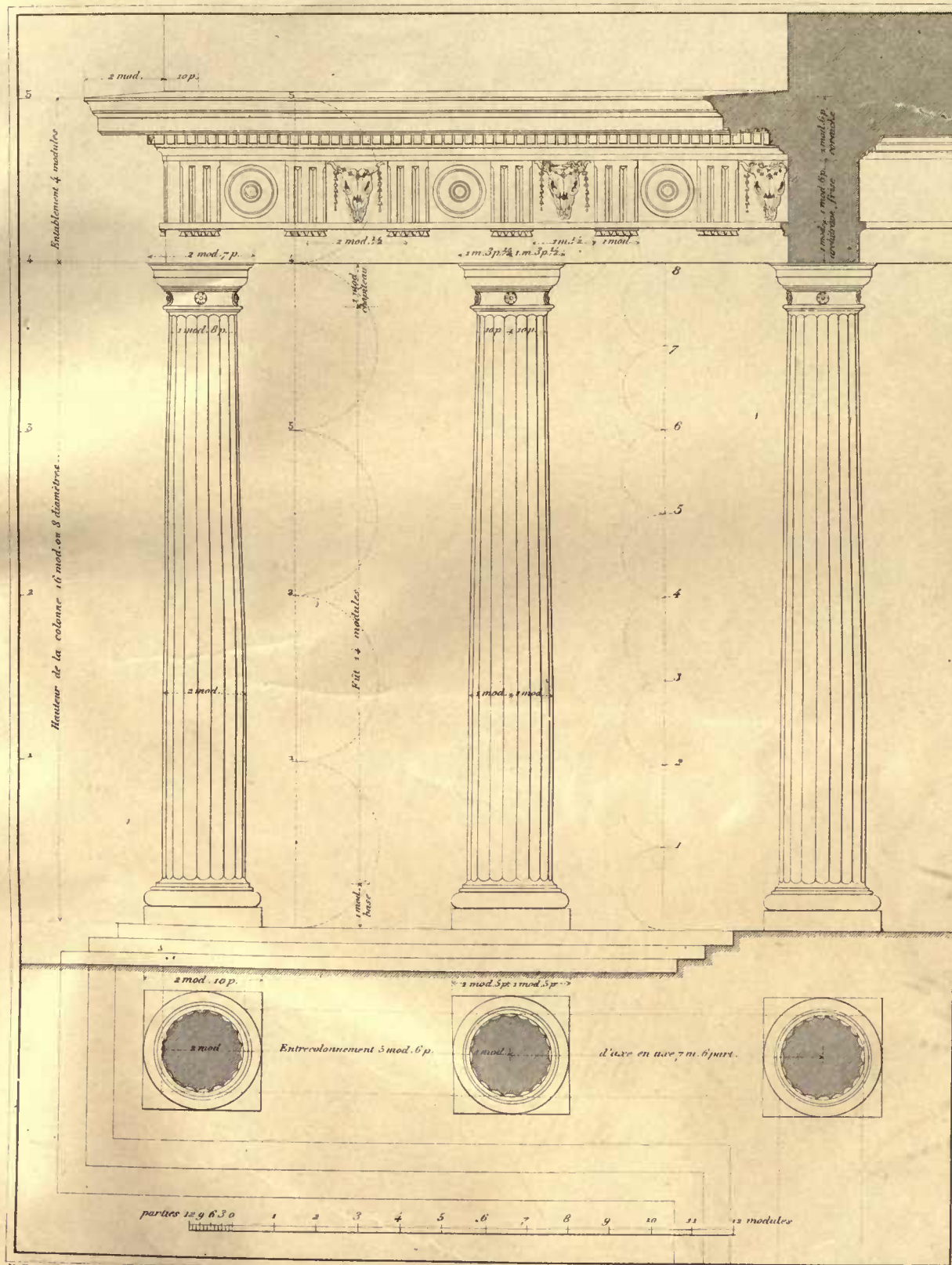
La figure 5ème qui donne l'imposte et l'archivolte de l'arcade toscane avec piédestal n'a point été faite avec les mesures données par Vignole, on a pensé devoir les corriger en quelques parties pour leur donner plus de grâce.





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Un fronton n'est autre chose qu'un pignon orné ou nu, quoiqu'il n'est dans bien placé que là où le pignon exact, la proportion des frontons est assez difficile à établir car elle varie dans les édifices antiques. Nous donnons ici le procédé indiqué par Vitruve qui nous paraît très rationnelle pour les ordres Toscan et Dorique. L'inspection des figures suffira pour comprendre les détails tracés.



P. Esquisse del.

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Strenuous, V.

Pour dessiner un entrecolonnement dorique il faut diviser la hauteur totale en cinq parties, une pour l'entablement et les quatre autres pour la colonne, ou bien comme le dit Vignole, diviser la hauteur en 20 parties, dont l'une sera le module. Le module se divise comme pour le Troscau en 12 parties, lui-même aura 16 modules ou 8 fois le plus grand diamètre. On donnera 1 module pour la base, 1 mod. pour le chapiteau, et il restera 14 modules pour la hauteur du fût. L'entablement a 4 mod. dont 1 mod. pour l'architrave, 1 mod. 12 pour la frise, et 1 module 12 pour la corniche. Toutes ces parties réunies donneront 20 modules pour la hauteur générale de l'ordre.

Dans la frise les triglyphes sont toujours à plomb sur l'axe des colonnes. Ils ont 1 module de largeur. Les métopes sont carrées; elles ont 1 module 12. On peut les orner de divers ornements tels que têtes de bœuf, armures, patères &c. L'entrecolonnement dorique est toujours déterminé par le nombre des triglyphes. La colonne a 20 cannelures. Le gubbe du fût se trace comme pour le troscau.

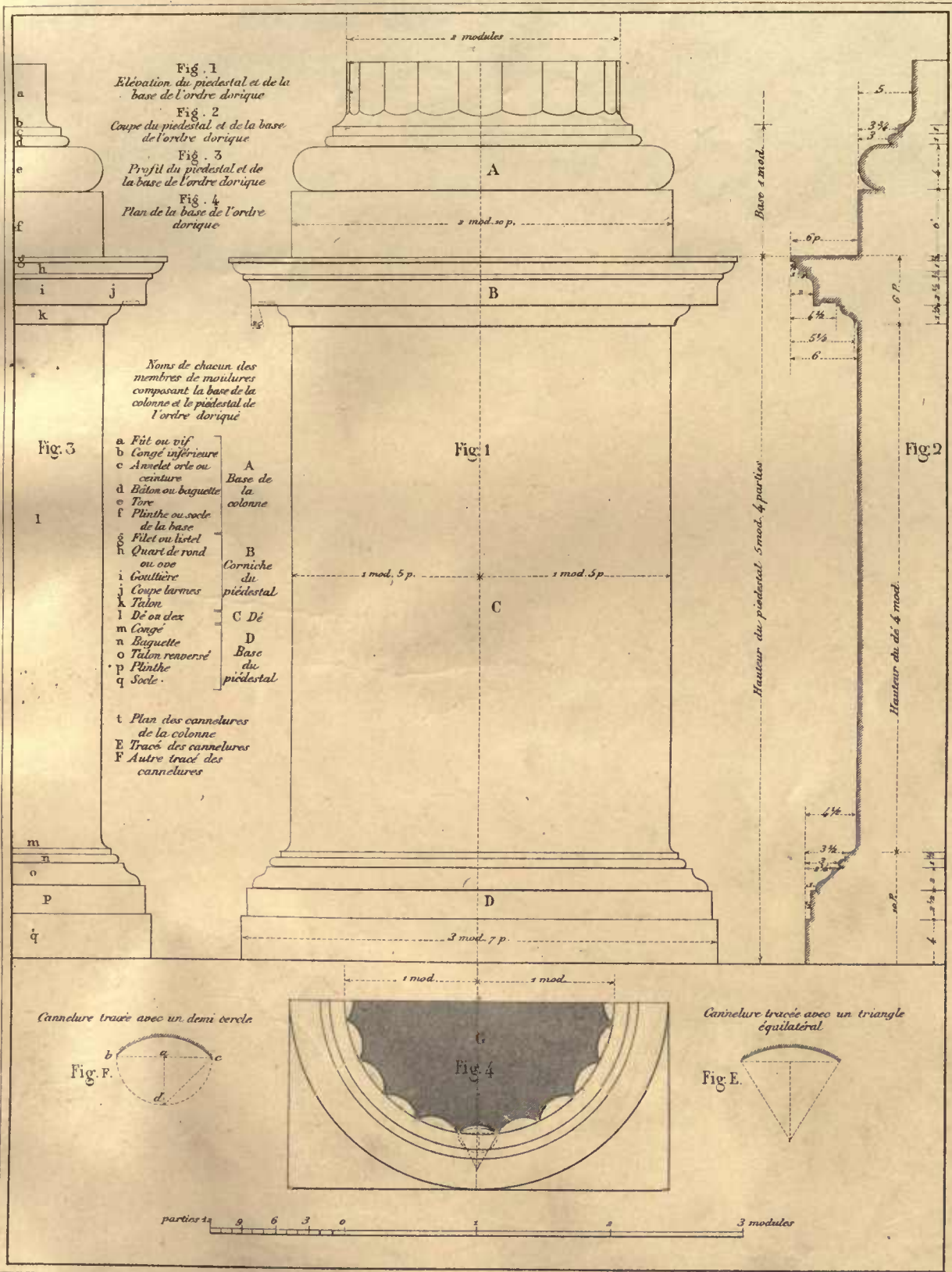
FORTIQUE DORIQUE SANS PIEDestal

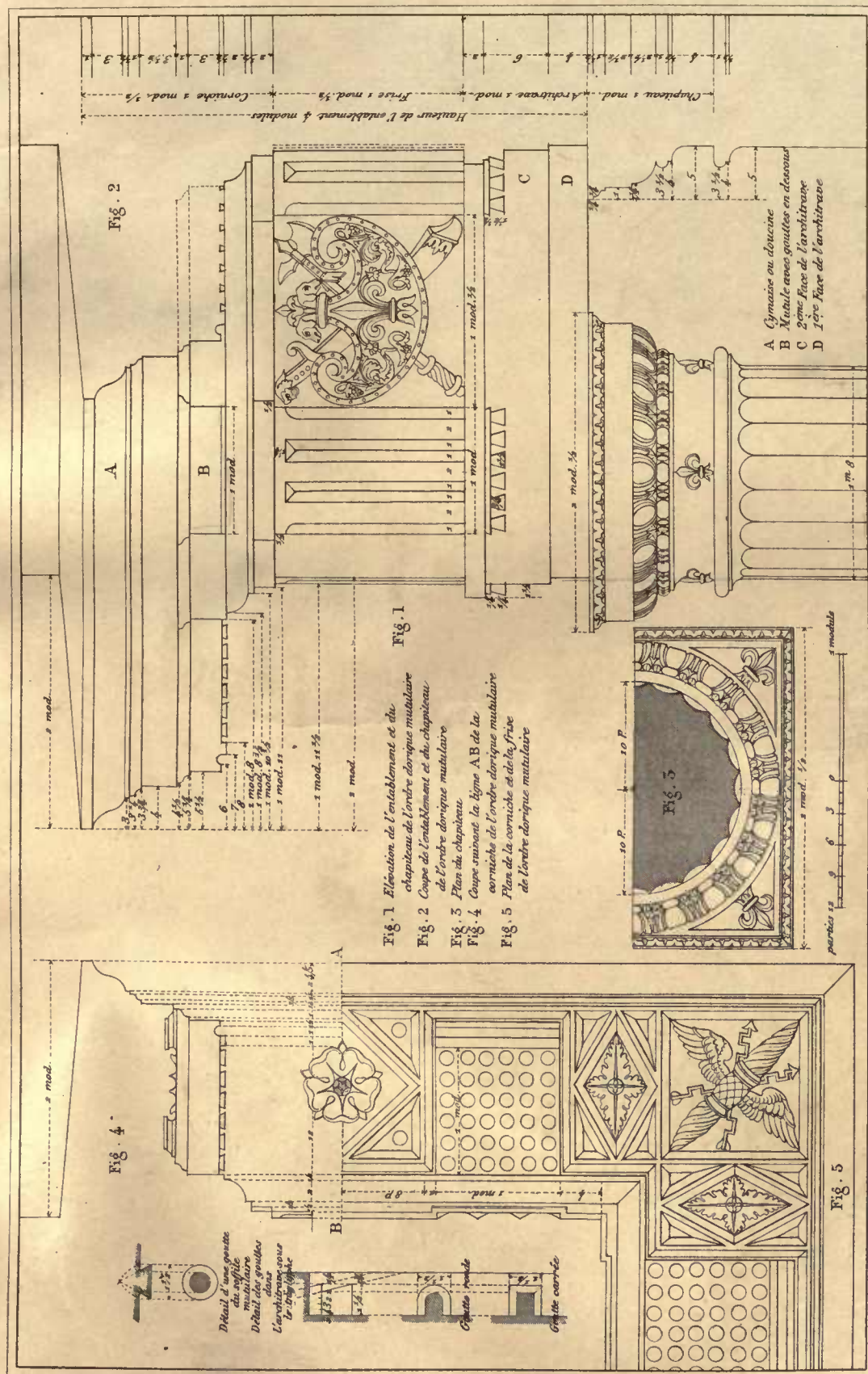




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Strasman, Sc.





P. Esquié. del.

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Requiert del.

Cet orbe diffère assez sensiblement du précédent. Pour la corniche, le cauet est remplacé par une doucine et le talon par un quart de rond. Les mutules qui n'existent pas dans le denticulaire donnent une plus grande solidité à la corniche et contribuent à l'enrichir. L'architrave comporte deux faces au lieu d'une et le chapiteau comporte divers ornements dans ses moulures. L'ordre dorique mutulaire, plus riche que le denticulaire est le plus en usage dans les constructions monumentales ou priodes.

Stevemann, de



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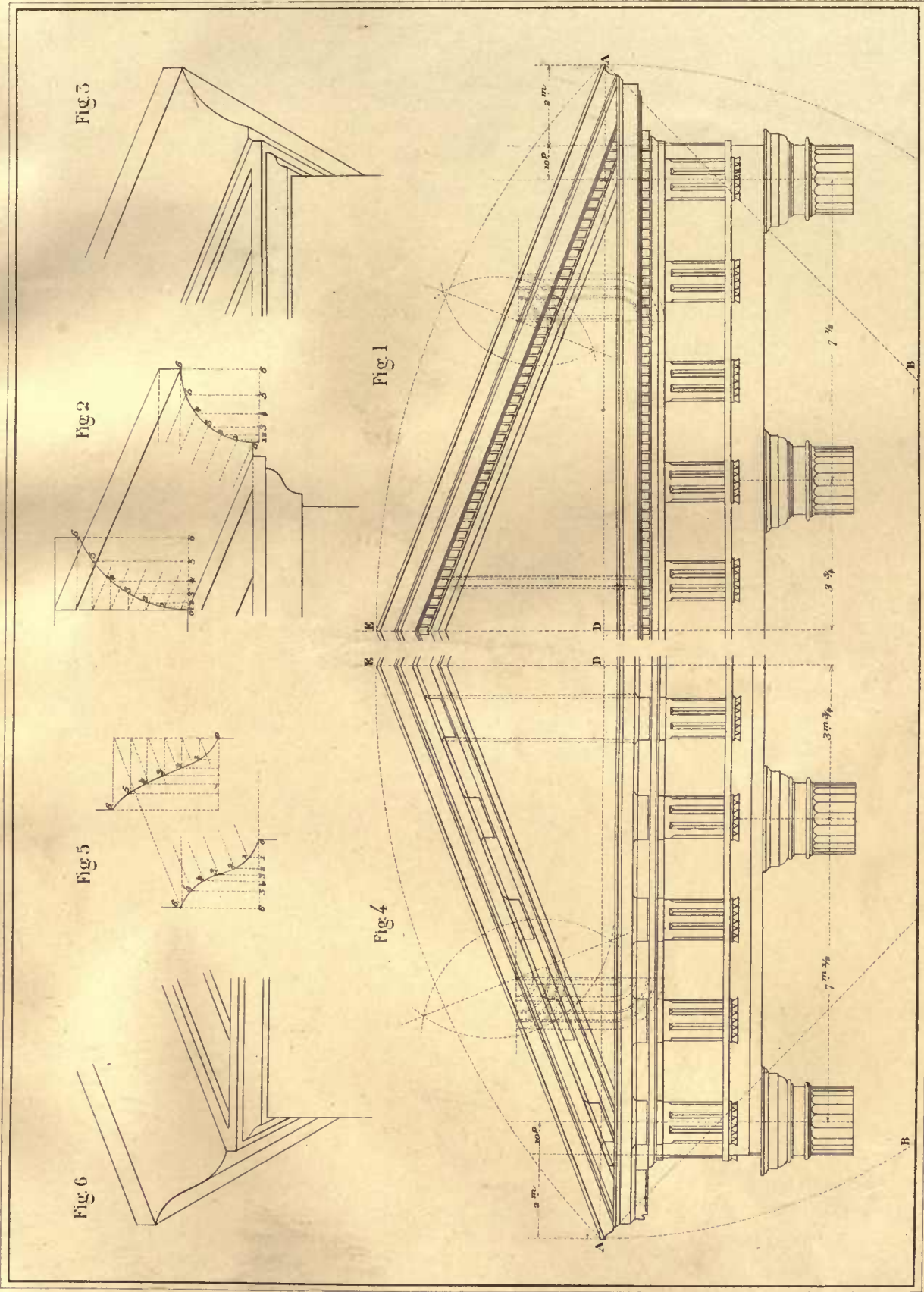
CHARLES SCHMID, RÔTEUR, 37, rue des Ecoles — Paris.

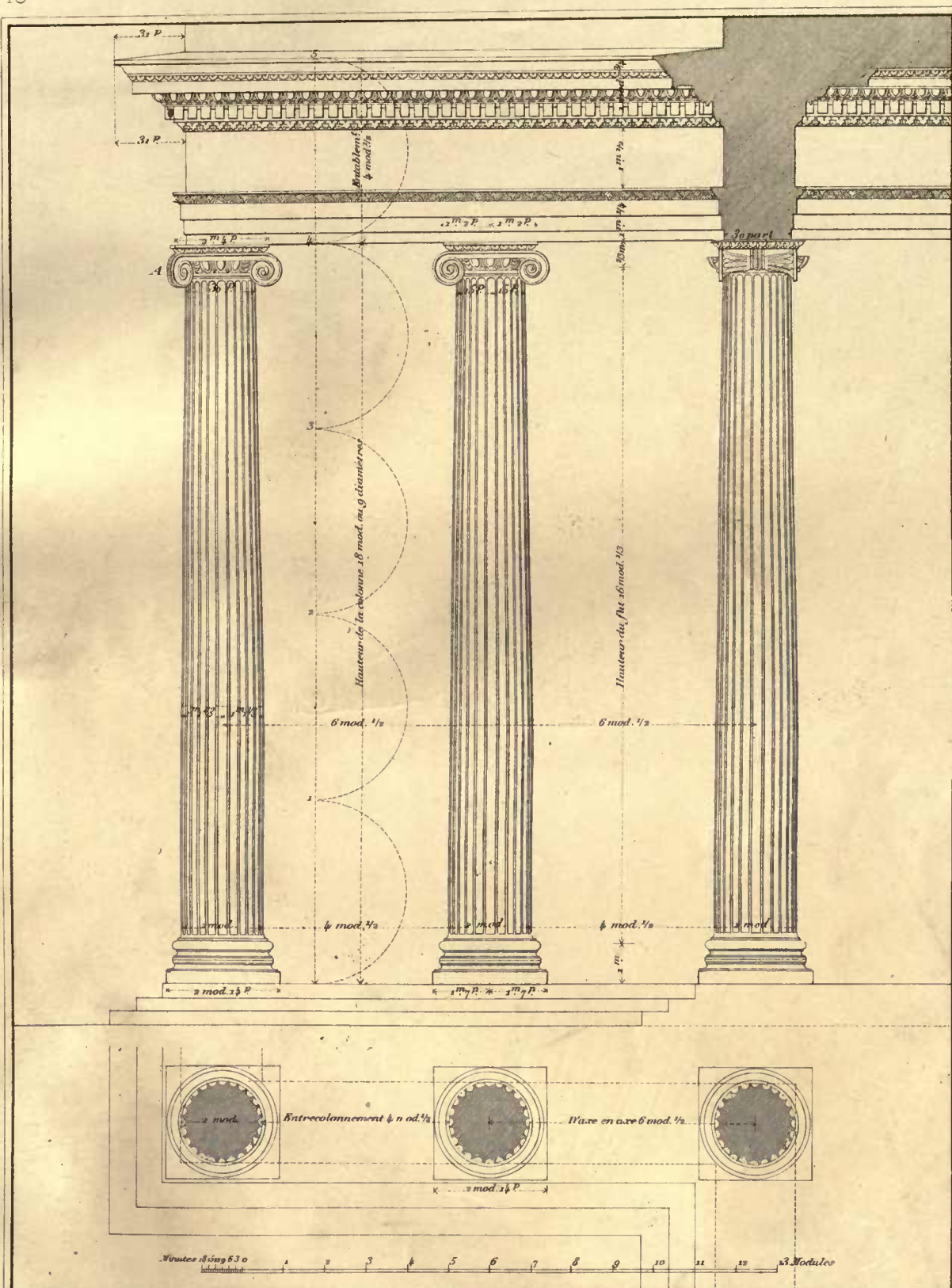
Cette planche représente un portique Dorique Muséum de trois entrecolonnements. L'entrecolonnement est déterminé par le nombre des triglyphes. Le maximum ne doit pas dépasser trois entre-triglyphes. — Pour le tracé du fronton, on se reportera à la planche suivante.

Stramand, Sc.

Strasman, Sc.

Chap R Engelmann, Paris



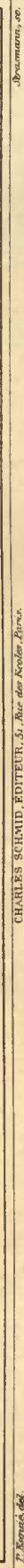


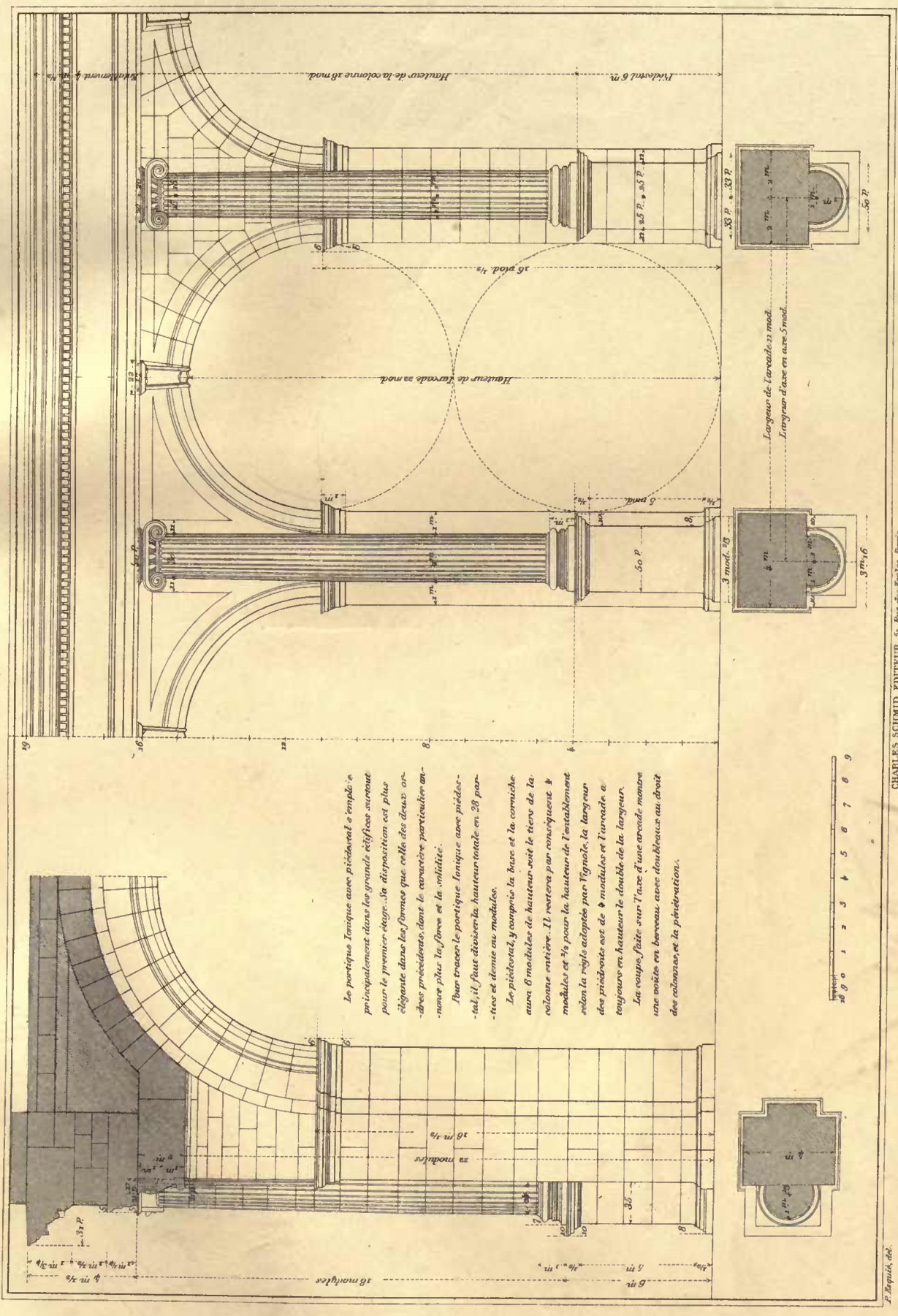
1.º Requie, del.

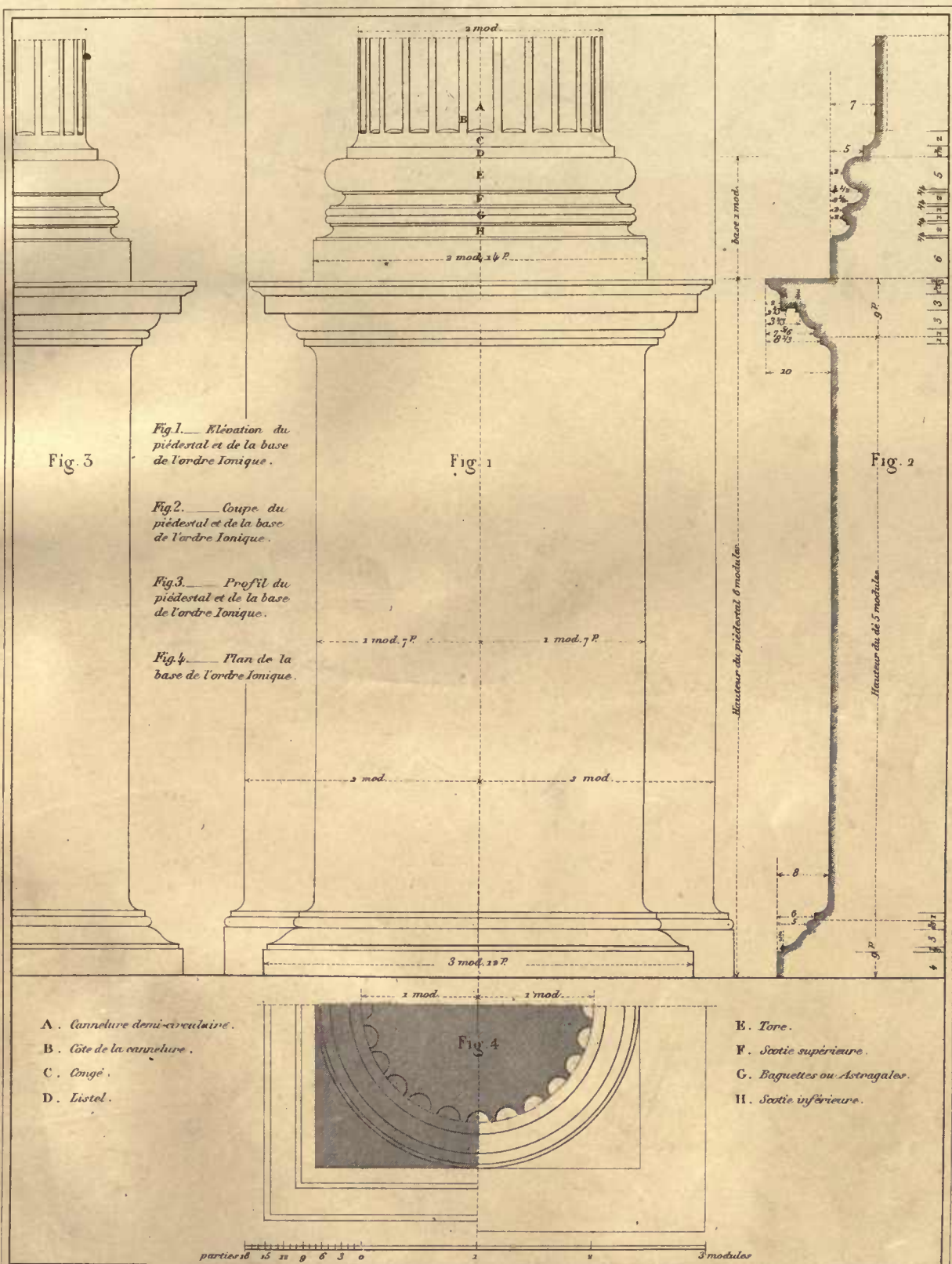
CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles, Paris.

Strosmann, sc.

L'entrecolonnement Ionique se fait de même que les entrecolonnements toscans et doriques, en divisant la hauteur totale de l'ordre en 5 parties dont les 4 inférieures forment la hauteur de la colonne en dixième cette hauteur en 23 parties ce qui donnera le module, le module de cet ordre se divise en dix-huit parties ou minutes pour les diverses moulures qui composent cet ordre, on a besoin de cette division du module en 18 parties à cause des moulures qui sont plus nombreuses dans cet ordre qui est beaucoup plus délicat que les deux ordres précédents, il s'emploie ordinairement dans les intérieurs à cause de son élégance ou extérieurement dans les seconde étages des édifices, les romains l'ont employé dans divers temples un bel exemple de cet ordre se voit à Rome au temple de la Fortune civile, on remarquera que le chapeau d'angle A se retourne sur ces deux faces de sorte que l'on aperçoit toujours les volutes.







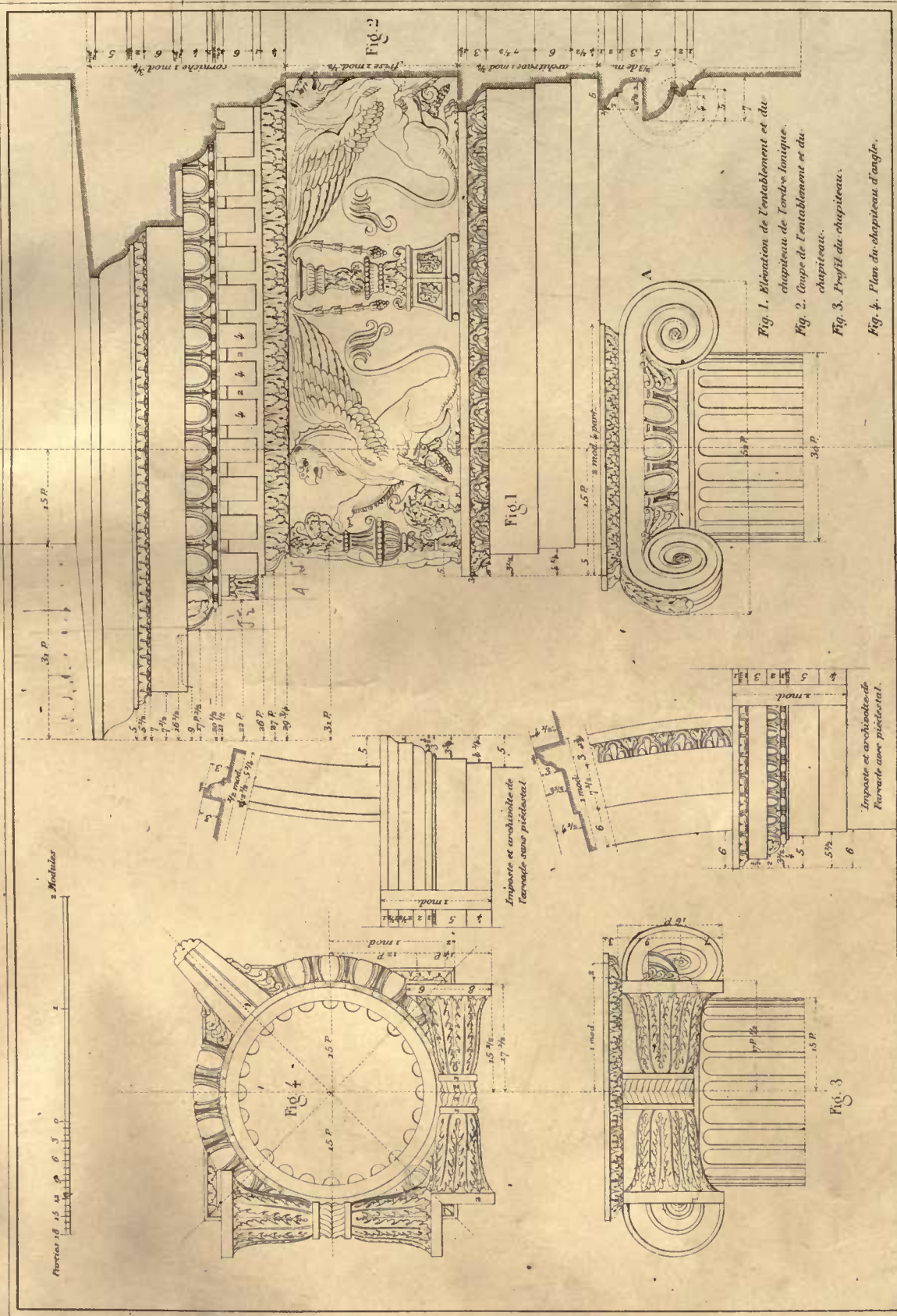
P. Esquisse, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Beaux-Arts, Paris.

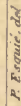
D. Armand, sc.

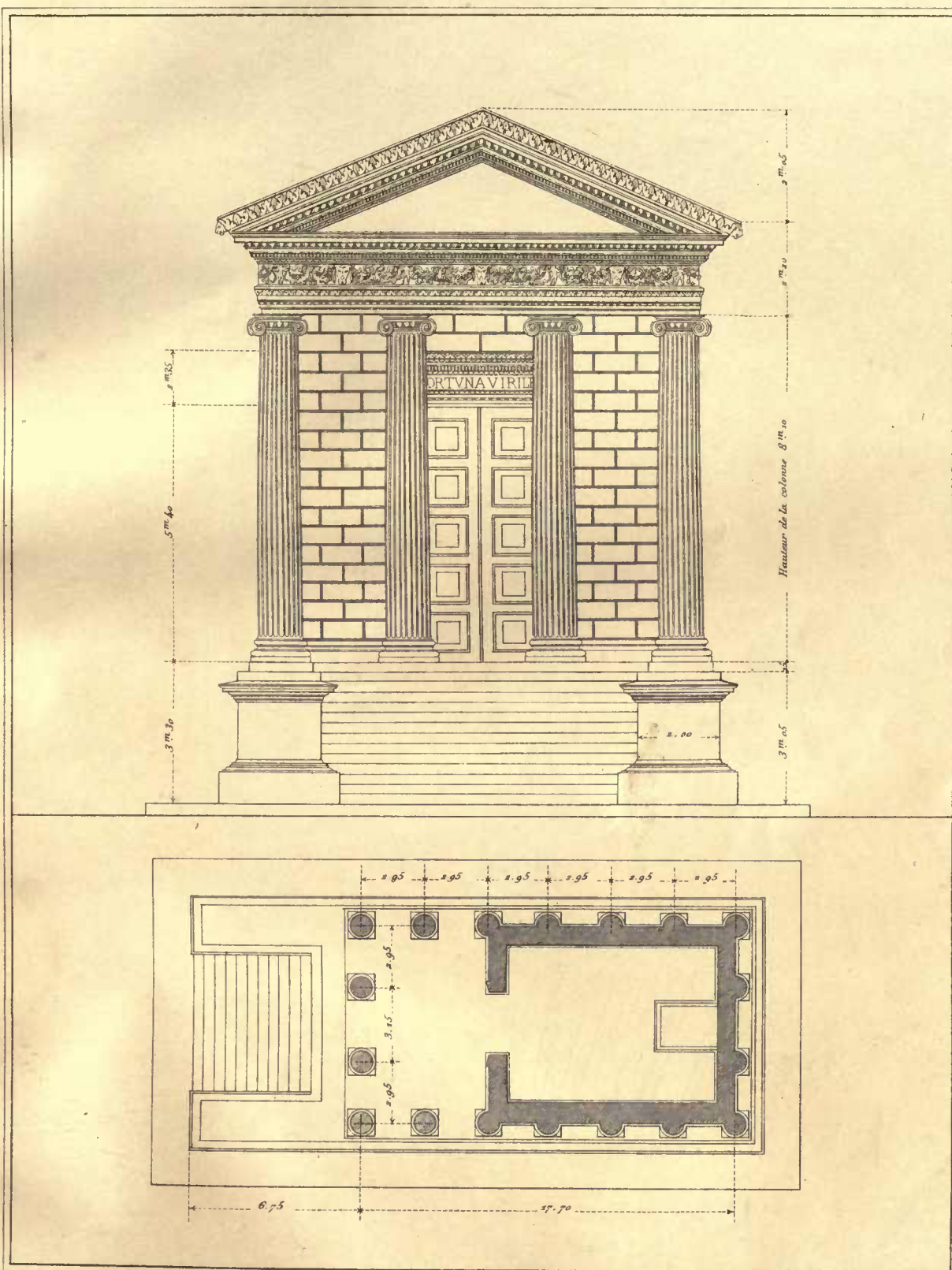
L'ordre Ionique occupe par sa forme et sa décoration le milieu entre le Dorique qui représente la force et la solidité, et le Corinthien qui est le type complet de l'élégance et de la richesse. Le goût si épuré des grecs avait besoin d'un intermédiaire entre deux systèmes, l'un d'ordonnance simple, grave, et l'autre plus riche, plus noble.

Le piédestal Ionique que nous donnons dans cette planche a le tiers de la hauteur de la colonne, c'est-à-dire 6 modules, son enlèvement est de 1 module de hauteur, le dex à 5 modules de hauteur, les deux fûts compris, la base que nous donnons est celle de Vignola, nous donnerons plus loin l'exemple de la base attique que les anciens employaient; elle a un module de hauteur, sans y comprendre le listel ou ceinture, le fût de la colonne est orné de 24 cannelures demi-circulaires qui se terminent carrément à la naissance du congé, la largeur de la côte de la cannelure a les $\frac{2}{3}$ de l'ouverture de cette cannelure.



PL. XXIII



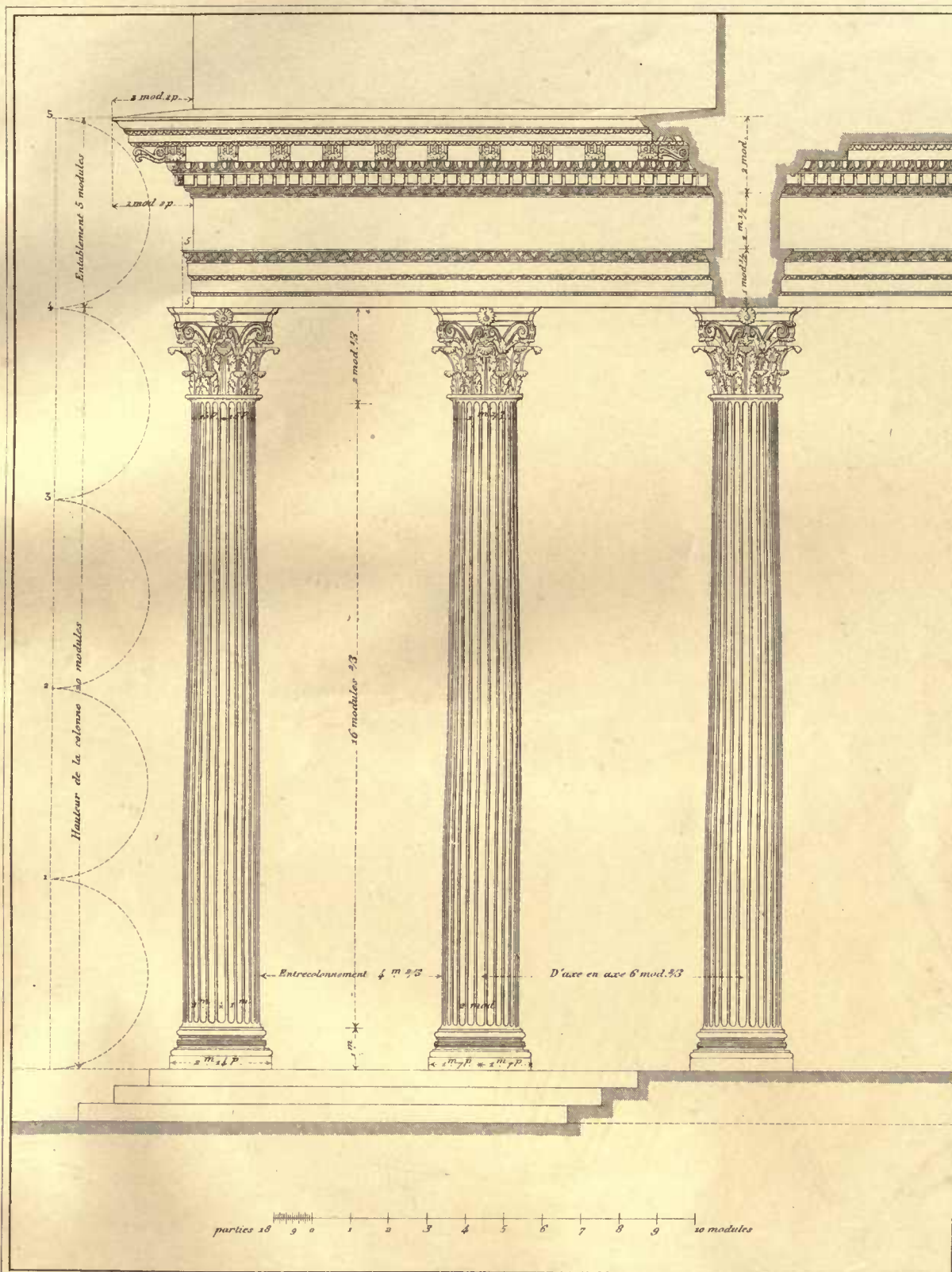


F. Esquis. del.

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Strassmann, Sc.

Nous donnons comme complément de l'ordre Ionique un exemple d'un temple bâti par les Romains, qui le dédièrent à la fortune virile. C'est le plus bel exemple de cet ordre qui nous soit resté aussi complet. Nous avons cru devoir le placer sous les yeux des élèves qui commencent, afin de les engager dès leur début dans l'art de l'architecture, à ne jamais s'écarter des bonnes traditions, et à se bien pénétrer des beautés de l'antiquité.



F. Enquière del.

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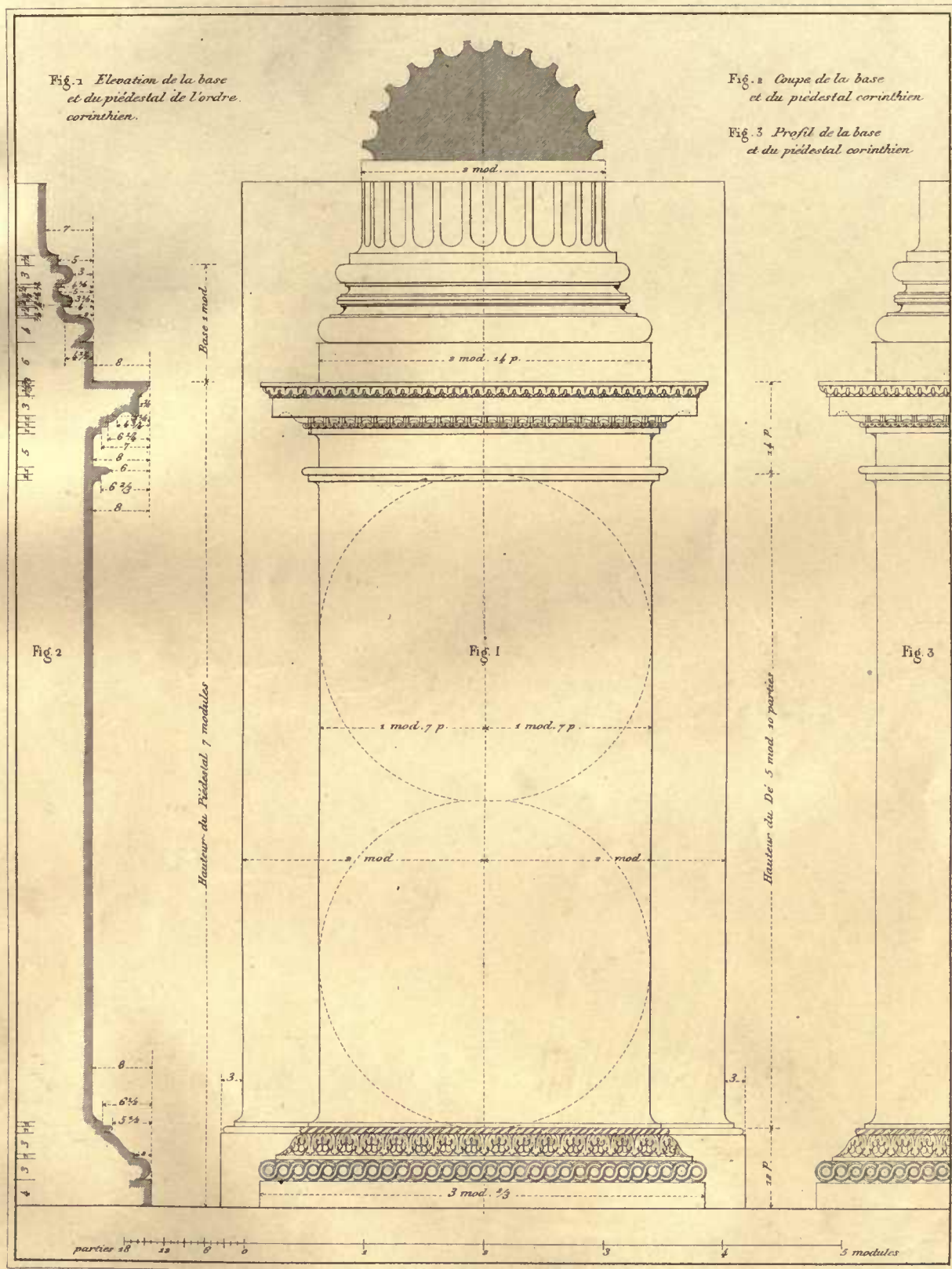
Straussmann, Sc.

Pour tracer l'entablement corinthien on divise la hauteur totale en 18 parties, dont une sera le module, qui se divise aussi en 18 parties ou minutes, comme dans l'ordre ionique. Vignole fixe la largeur entre les colonnes à 4 modules $\frac{2}{3}$, afin d'accorder la division des modillons dans la corniche, et qu'il s'en trouve toujours un sur l'axe de chaque colonne.

Cet ordre l'emporte par sa magnificence sur tous les autres, on l'emploiera principalement pour les grands monuments, tels que les temples et les palais.







P. Esquié, del.

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Strasmann, Sc.

Le module de l'ordre corinthien se divise en 18 parties ou minutes. Vignole pour cet ordre, fait une exception à la règle générale qui veut que le piédestal soit le $\frac{1}{3}$ de la colonne. Afin de lui donner la grâce proportionnelle à l'ordre.

Vignole conseille de lui donner 7 modules de hauteur. De cette façon le dé du piédestal, forme deux carrés superposés. Toutefois on pourrait élever la plinthe de la base du piédestal et lui donner huit parties au lieu de quatre. — La base dessinée est celle donnée par Vignole. Les anciens lui ont substitué quelquefois celle dite attique dont les moulures sont d'une plus belle proportion.

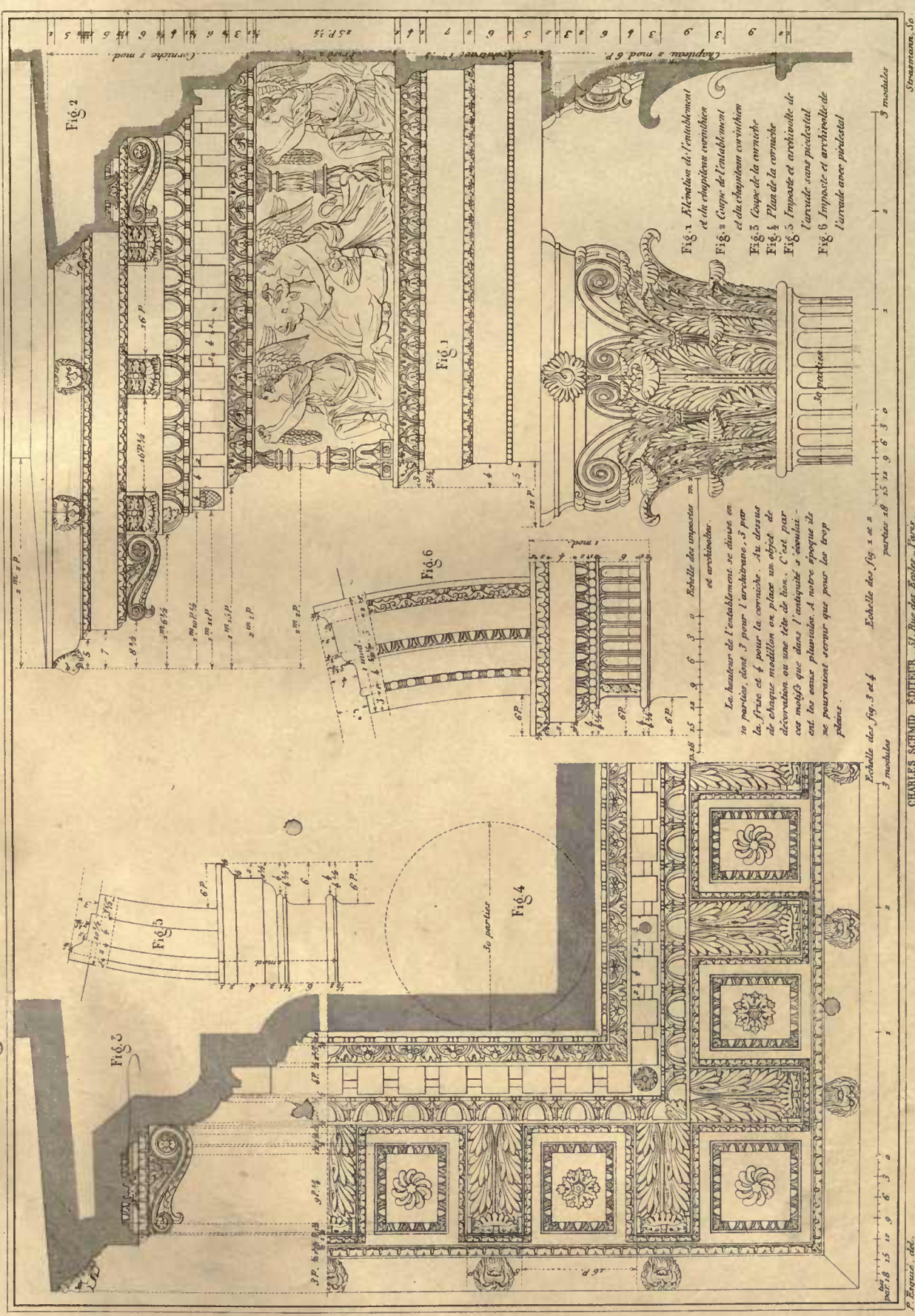


Fig. 1 Elevation de l'entablement et du chapiteau corinthien
Fig. 2 Coupe de l'entablement et du chapiteau corinthien
Fig. 3 Coupe de la corniche
Fig. 4 Plan de la corniche
Fig. 5 Imposte et archivolte de l'arcade sans piédestal
Fig. 6 Imposte et archivolte de l'arcade avec piédestal

La hauteur de l'entablement se divise en 10 parties, dont 3 pour l'architrave, 5 pour la frise et 2 pour la corniche. Au-dessus de chaque modillon on place un objet de décoration ou une tête de lion. C'est par ces motifs que dans l'antiquité s'expliquent les bas-reliefs. A notre époque ils ne pourraient servir que pour les bords plats.

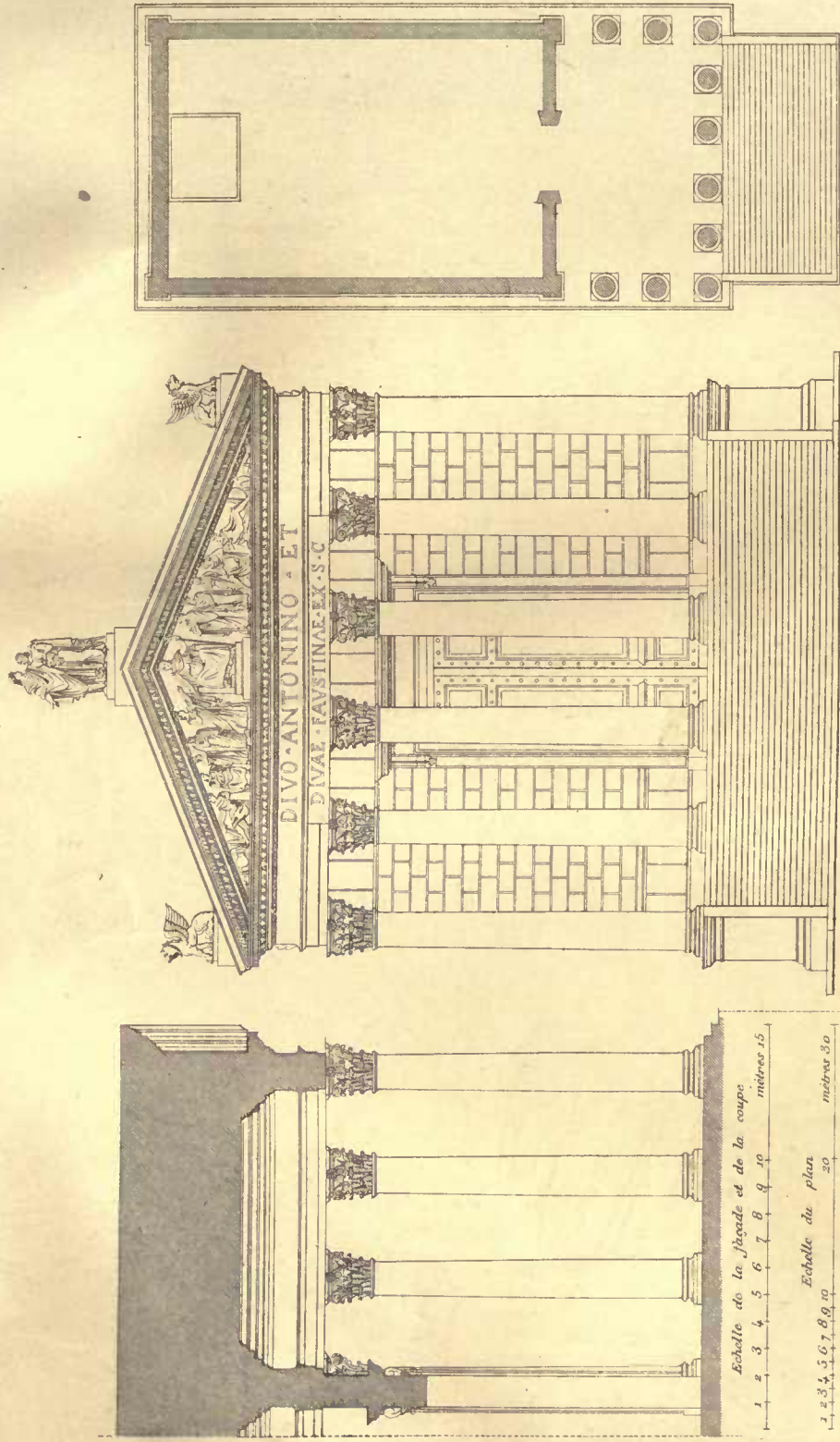
Echelle des fig. 1 et 4
parties de 15 à 30

Echelle des fig. 2 et 3
3 modules

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P. Engraver, del.

Strassmann, sc.



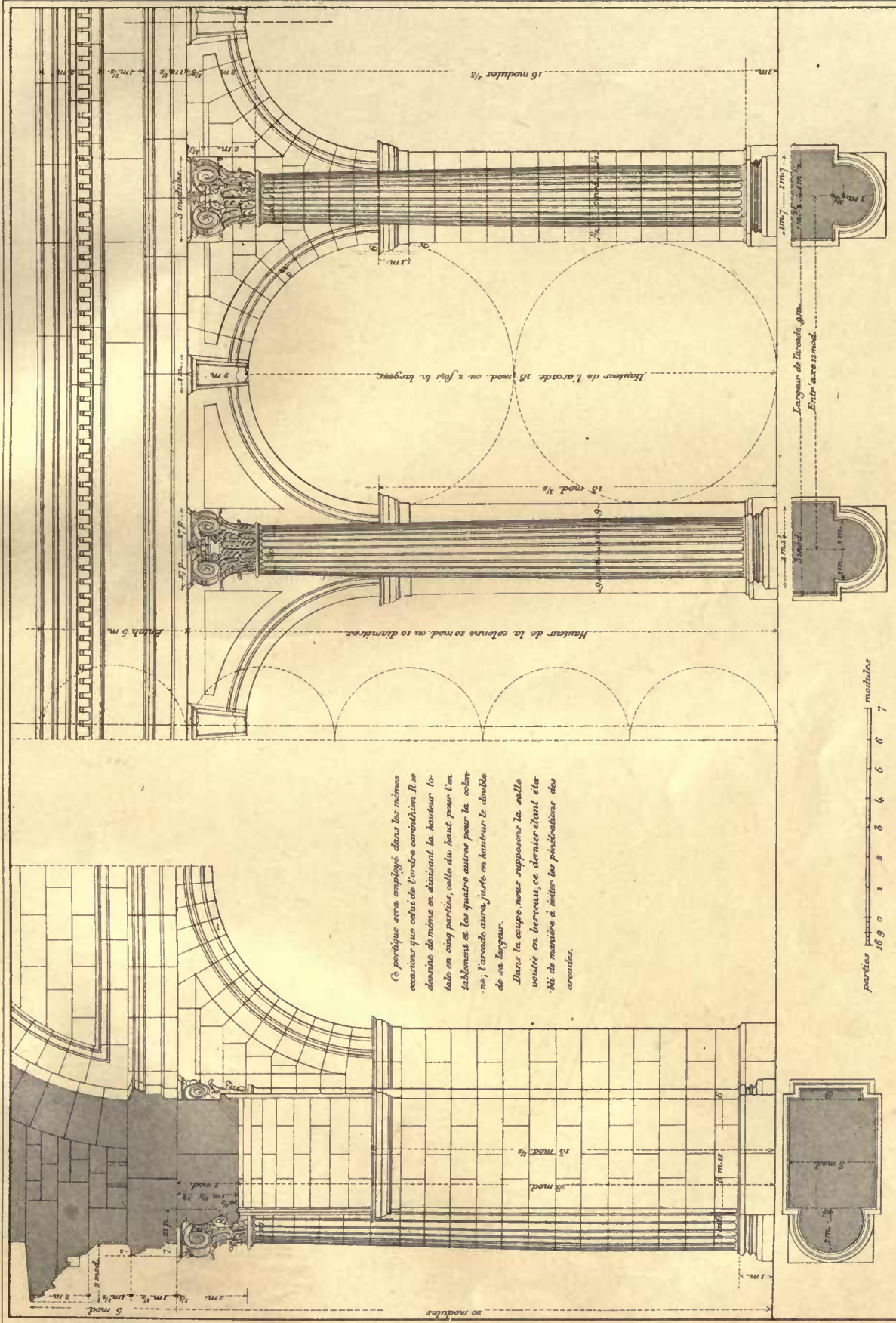
P. Esquise del.

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Cette planche donne un exemple de temple d'ordre corinthien à six colonnes. On remarquera que l'échelle de cet ensemble architectural est en mètres et non en modules afin d'indiquer les proportions réelles.

Brasman, n.

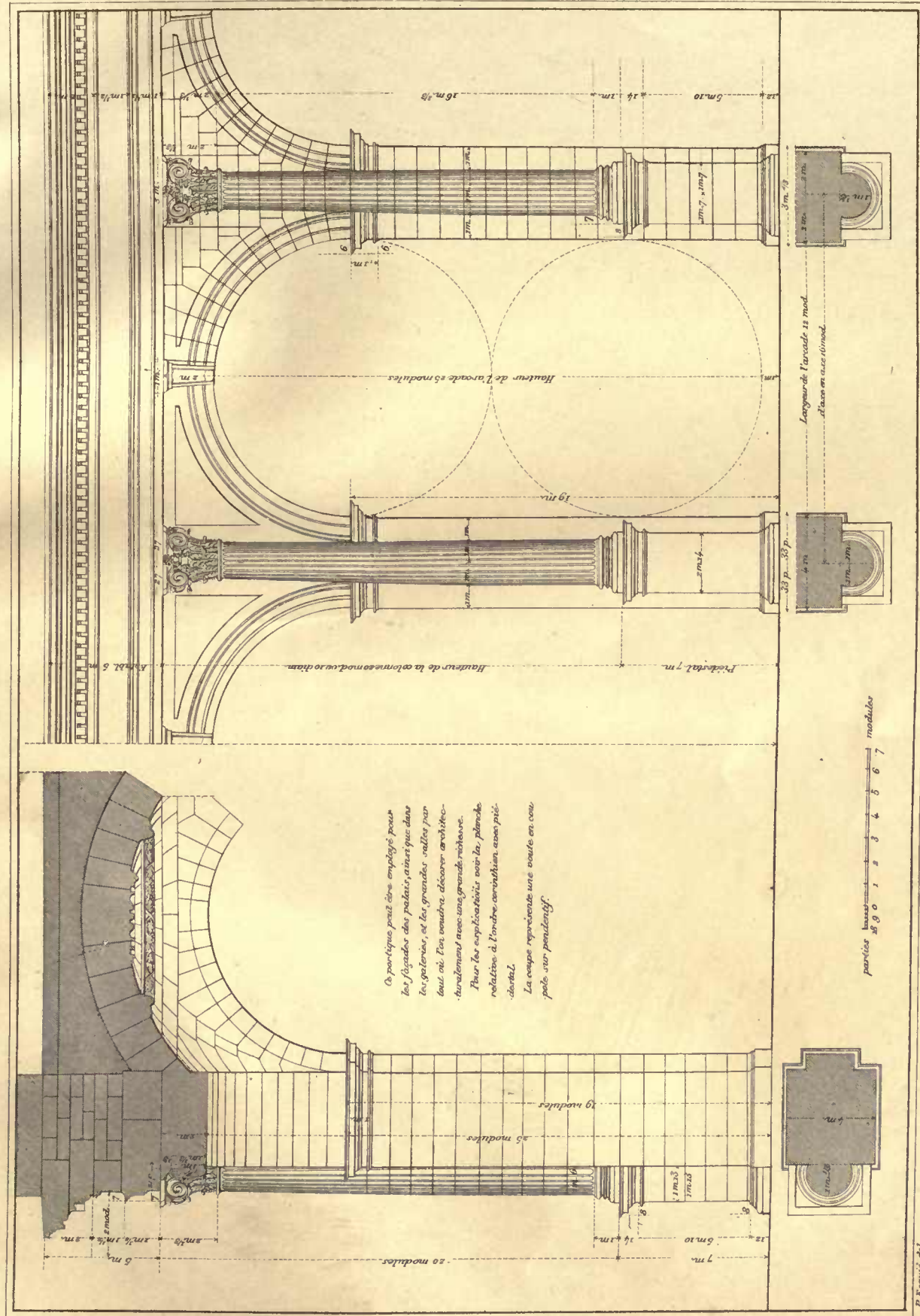


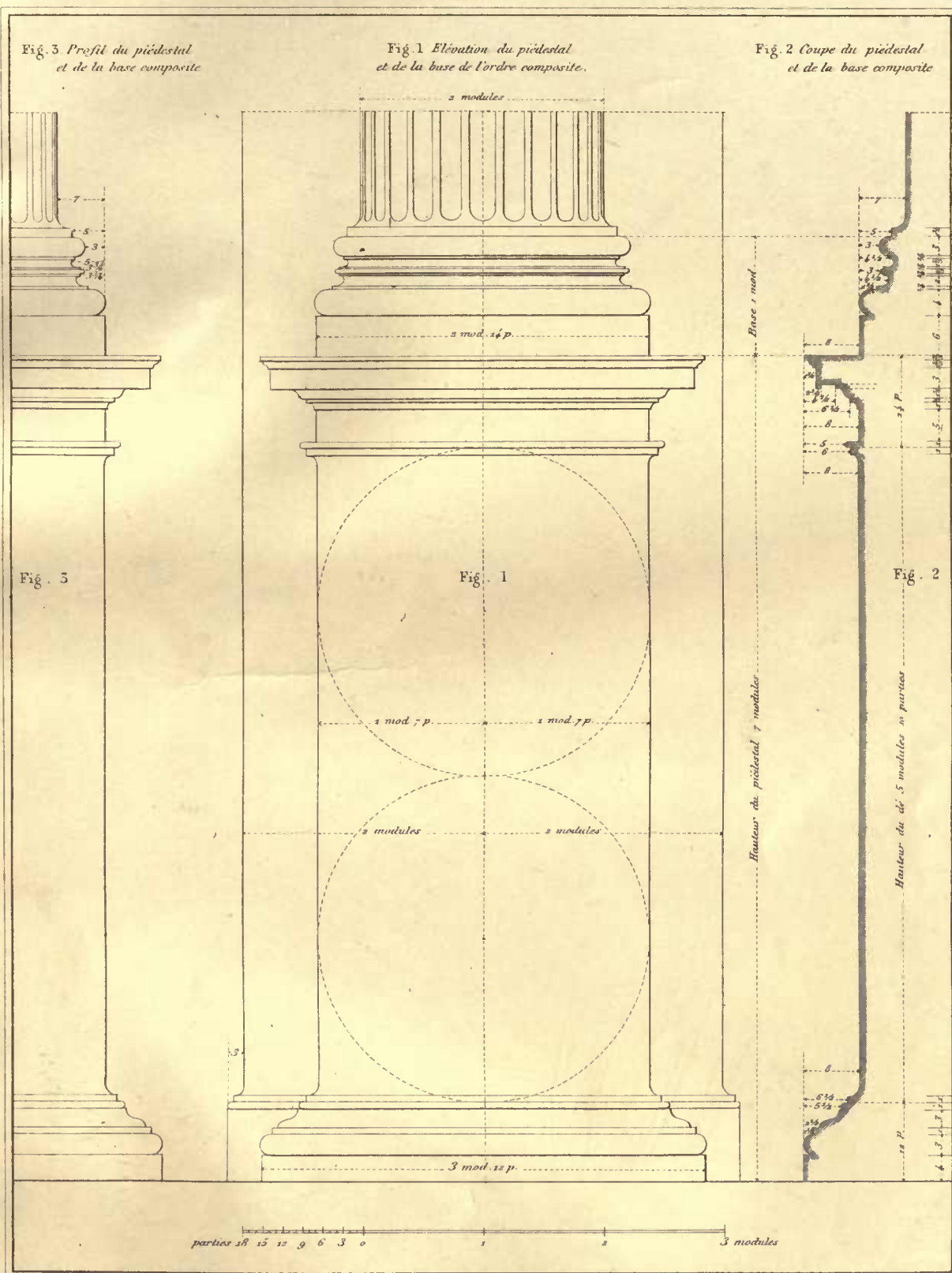


P. Esquibé, del.

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Strasmann, M.



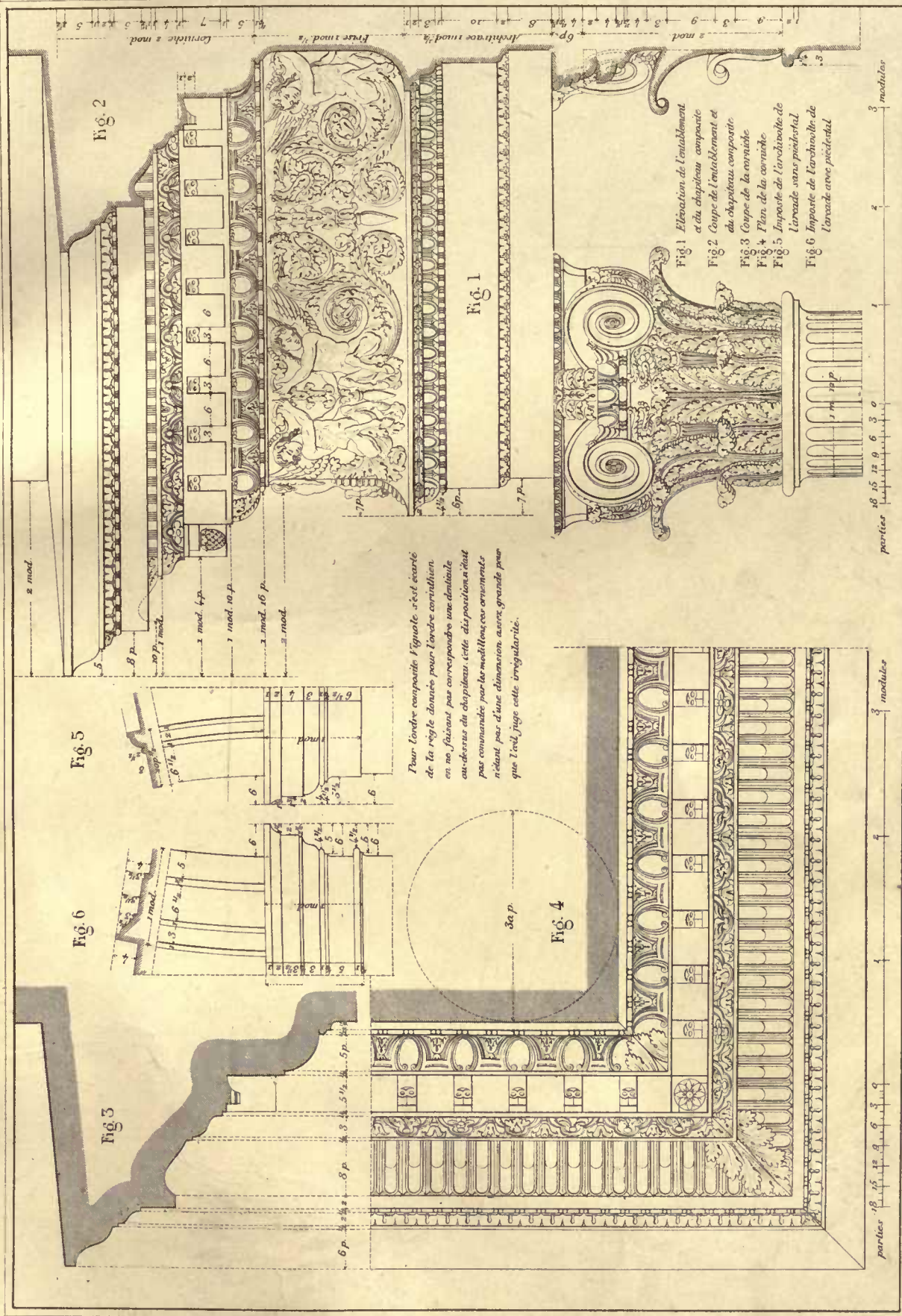


P. Boqué, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Écoles - Paris.

Strasmann, Sc.

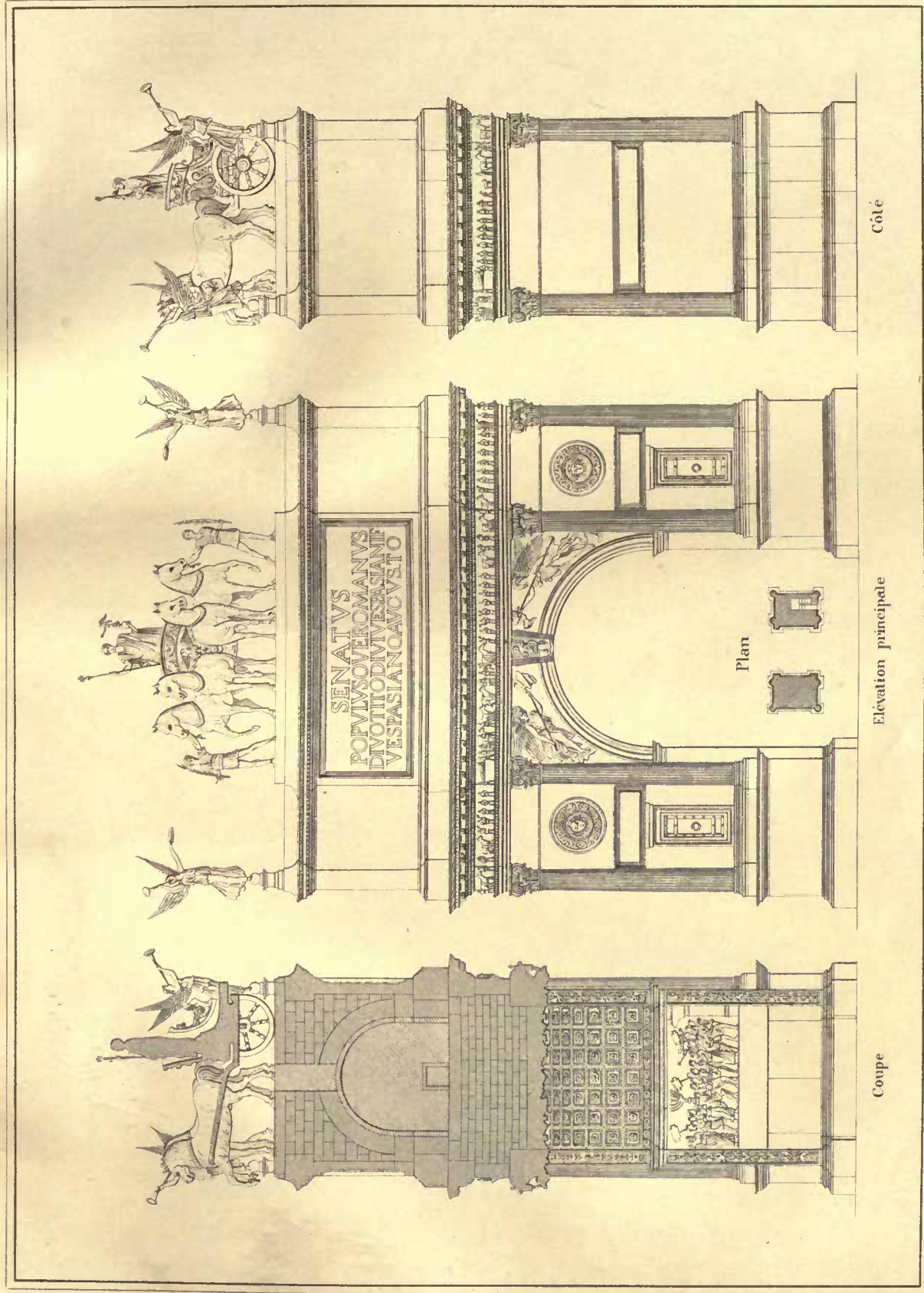
Les proportions du piédestal et de la base de l'ordre composite sont les mêmes que celles de l'ordre corinthien, la différence n'existe que pour les moulures de la cymaise ou de l'empatement. L'iguale n'a pas orné les moulures de ce piédestal, mais il ne faut pas regarder cela comme une règle absolue ou que cet ordre participe de l'ionique et du corinthien. Le fût de la colonne comporte comme le corinthien 24 cannelures, les côtes entre les cannelures ont les $\frac{2}{3}$ de la largeur de la cannelure.



P. Boquet, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Écoles, Paris.

Strasman, del.

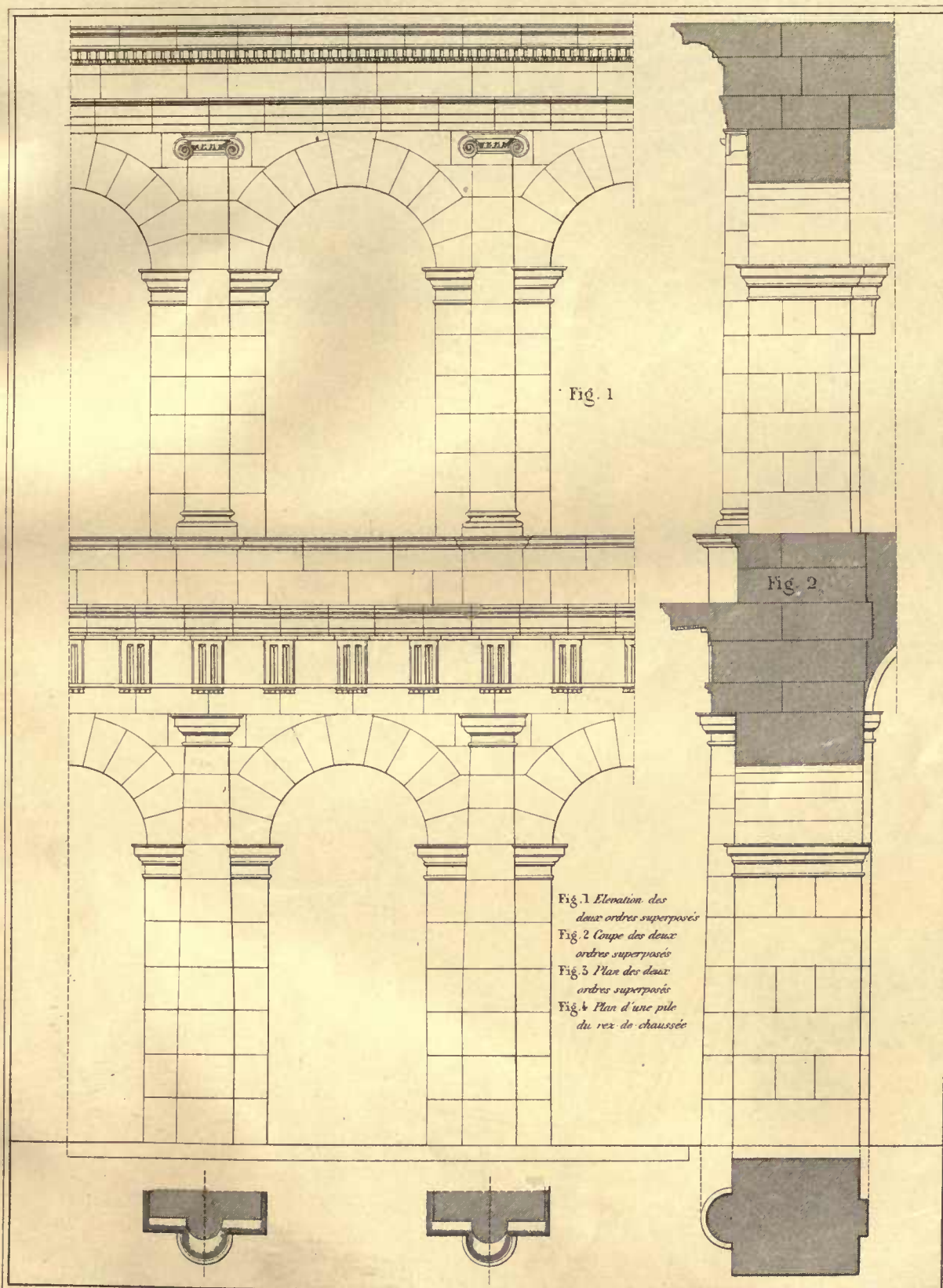


P. Esquis del.

CHARLES SCHMID, EDITEUR, 50, Rue des Écoles, Paris.

Stuckmann, sc.

L'Arc de Titus dont nous donnons ici la restauration peut faire juger de la manière dont les Anciens employaient l'ordre composite. On peut employer ce ordre pour les monuments qui nécessitent pas une grande sévérité.

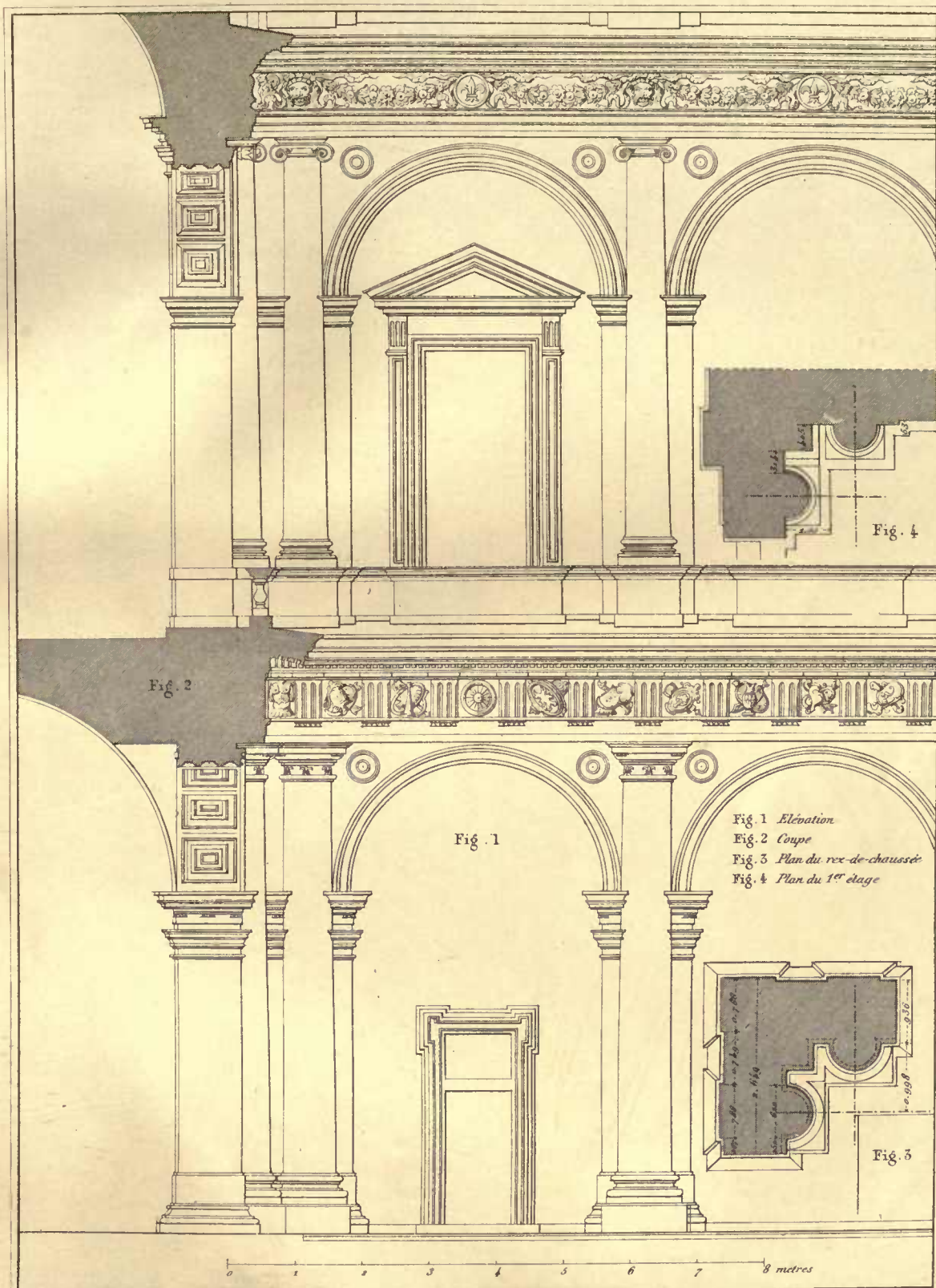


P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Écoles — Paris.

Straumann, Sc.

Nous donnons ici un premier exemple de superposition de l'ordre ionique à l'ordre dorique d'après le théâtre de Marcellus à Rome. On remarquera que la colonne ionique est plus courte que la colonne dorique de la hauteur d'un module de l'ordre dorique ou demi diamètre.



P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles - Paris.

Straßmann, Sc.

Cet exemple de superposition de l'ordre ionique à l'ordre dorique est tiré de la cour intérieure du Palais Farnèse à Rome. On y remarque la disposition de l'angle dont nous donnons le plan aux deux étages. Le plan du 1^{er} étage est indiqué et pointillé sur le plan du rez-de-chaussée.

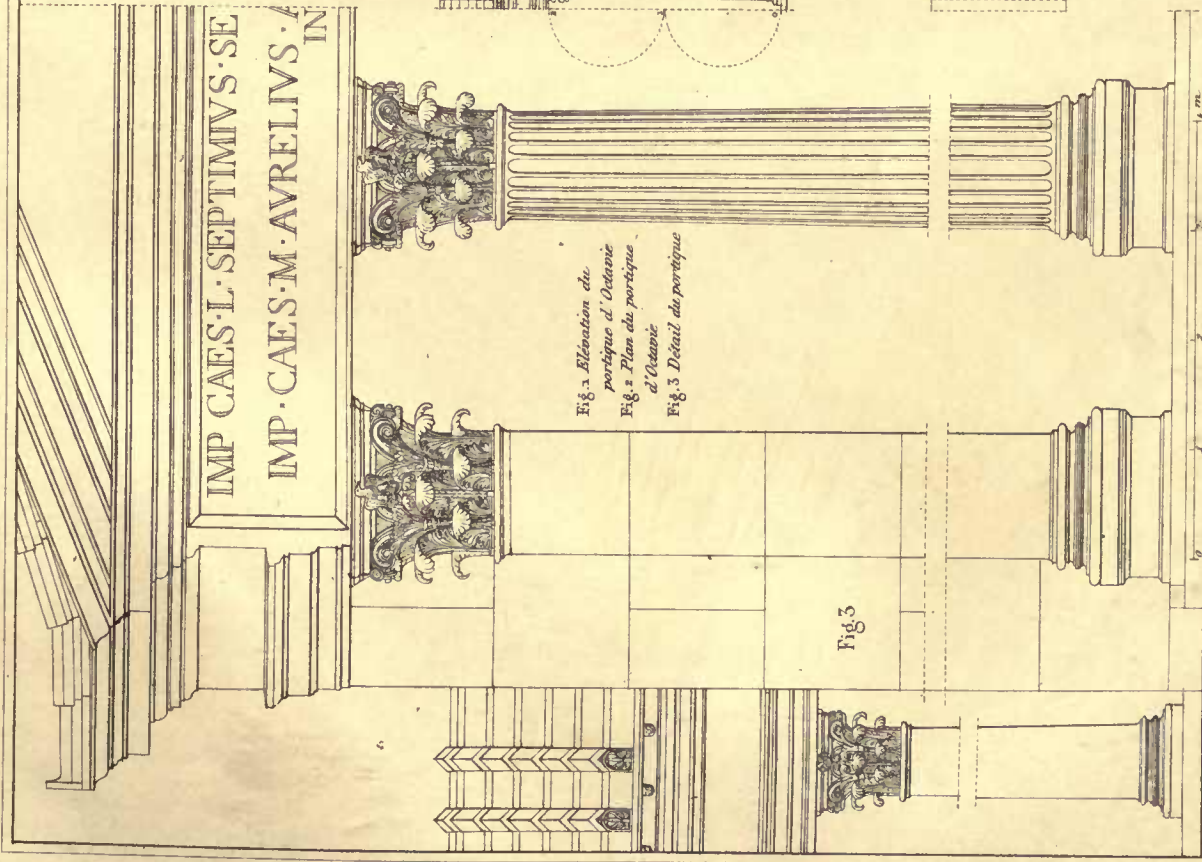
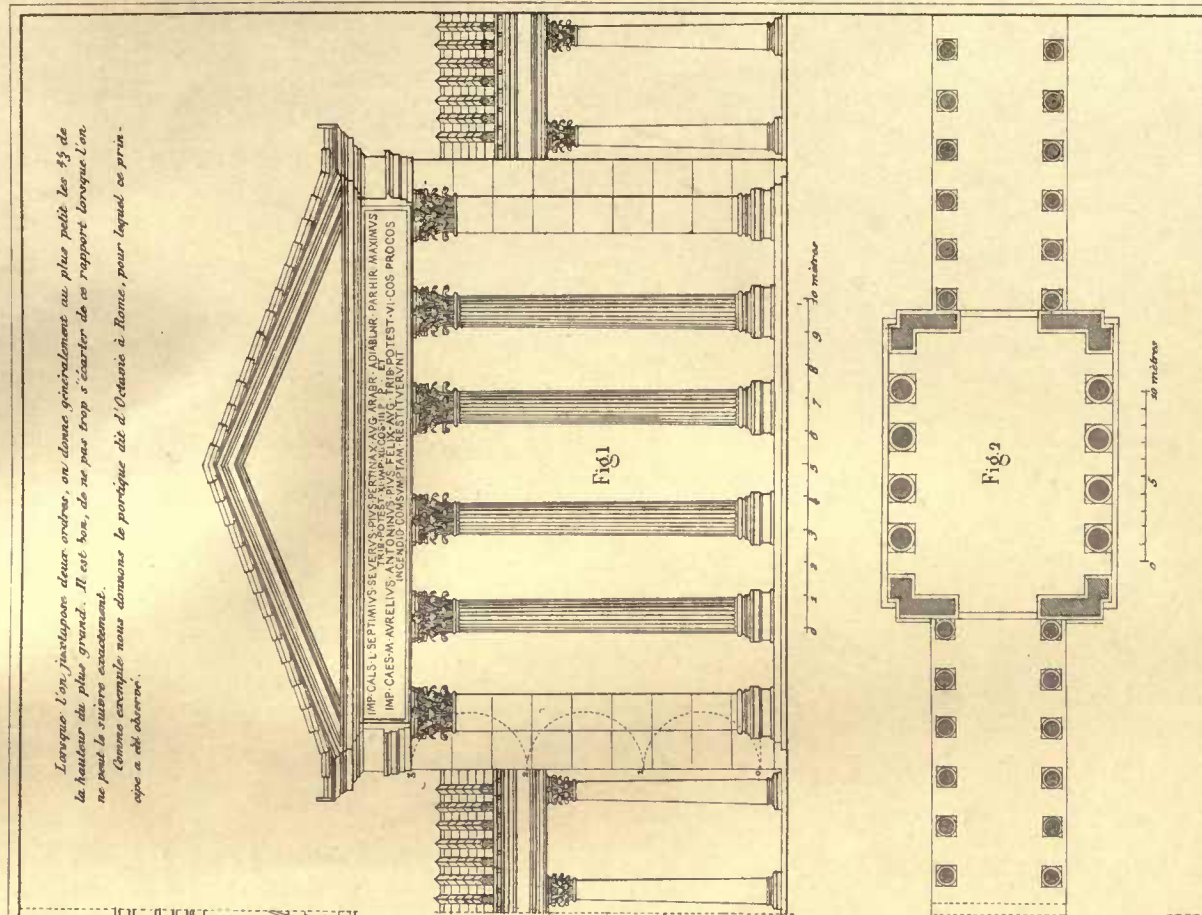
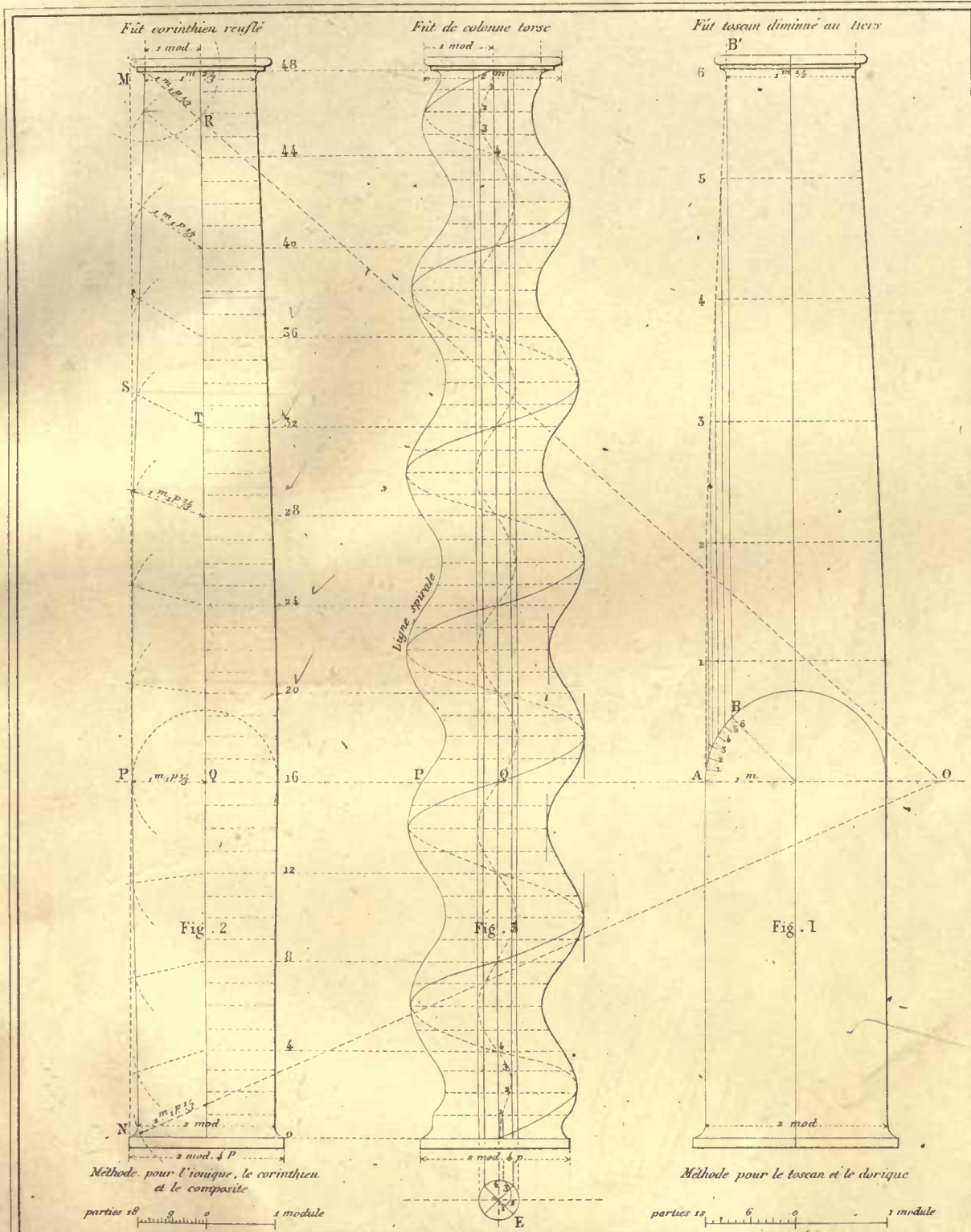


Fig. 3. Elevation du portique d'Octavie
Fig. 2. Plan du portique d'Octavie
Fig. 3. Détail du portique



Lorsque l'on juxtapose deux ordres, on donne généralement au plus petit les $\frac{2}{3}$ de la hauteur du plus grand. Il est bon, de ne pas trop s'écarter de ce rapport lorsque l'on ne peut le suivre exactement.
Un bon exemple nous donne le portique dit d'Octavie à Rome, pour lequel ce principe a été observé.



P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Écoles - Paris.

Straumann, Sc.

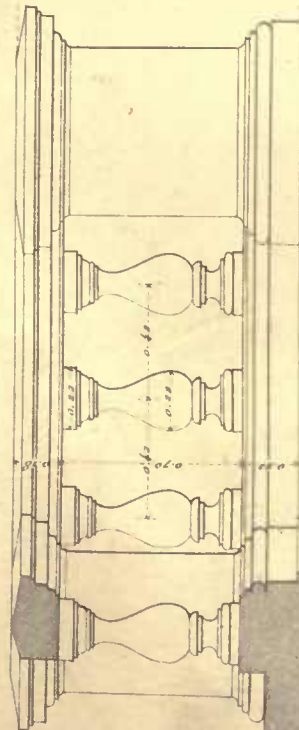
La diminution ou le galbe des colonnes peut se faire de plusieurs manières. Nous indiquons les deux que Vignole considère comme les meilleures. —

Fig. 1. On détermine d'abord la hauteur, la grosseur de la colonne et la quantité dont on veut diminuer, du tiers au sommet. On trace un demi-cercle au départ du galbe et l'on divise en autant de parties que l'on veut l'arc AB, le point B étant la projection de B'. Le reste se comprendra par l'inspection de la figure.

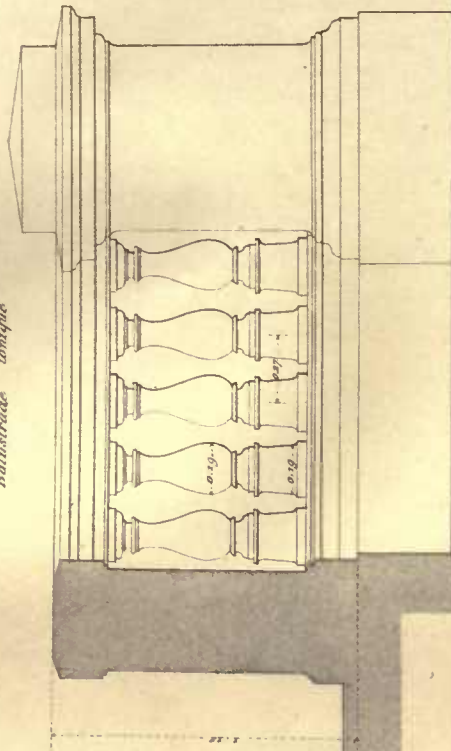
Fig. 2. Les données étant bien étudiées ainsi qu'il a été fait pour la méthode toscane, on mène la ligne PO, puis, du point N, traçant un arc MR'PQ, on obtient, en prolongeant cette ligne, le point O, duquel on mènera autant de lignes que l'on désirera obtenir de points, mais en faisant toujours, par exemple ST'PQ.

Fig. 3. Si l'on veut obtenir une colonne toise, on dessinera d'abord une de ces deux colonnes droites; on tracera ensuite un petit cylindre que nous avons marqué en plan en E pour indiquer de combien on veut que la colonne soit toise. On divisera le cercle en huit parties égales, pour élever, de ces points de division, quatre lignes parallèles à la cathète, partageant la colonne en quarante-huit parties égales, on formera la spirale du milieu, qui sera le centre de la colonne. À ce centre on rapportera la grosseur correspondante de la colonne droite, ligne pour ligne. On remarquera que les nombres 1, 2, 3, 4 ne servent que pour la première circonvolution en montant, parce que c'est du centre qu'il faut commencer cette première montée; il faut suivre, pour tout le reste, la circonférence du petit cercle, hormis la dernière circonvolution d'en haut pour laquelle on opérera comme en bas.

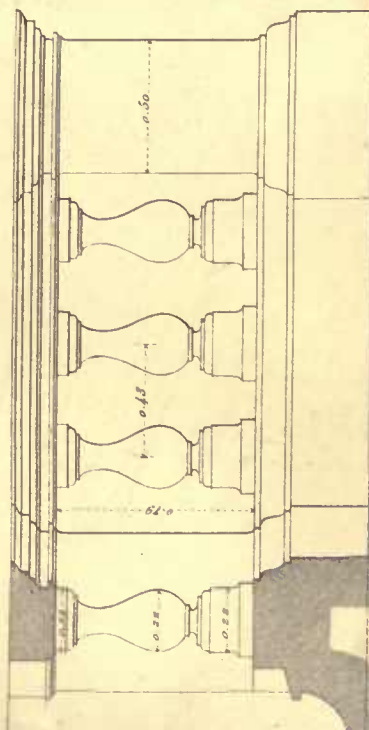
Balustrade toscane



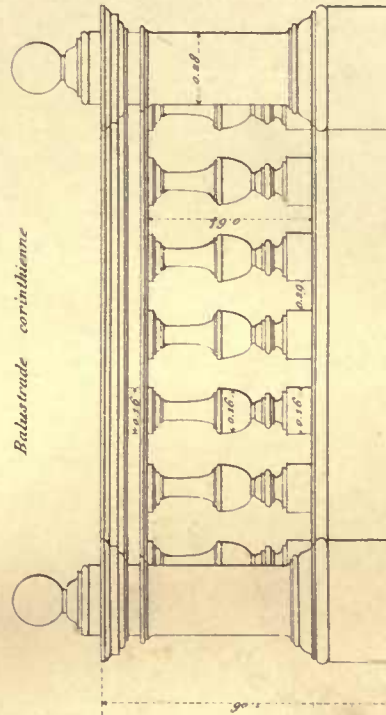
Balustrade ionique



Balustrade dorique



Balustrade corinthienne



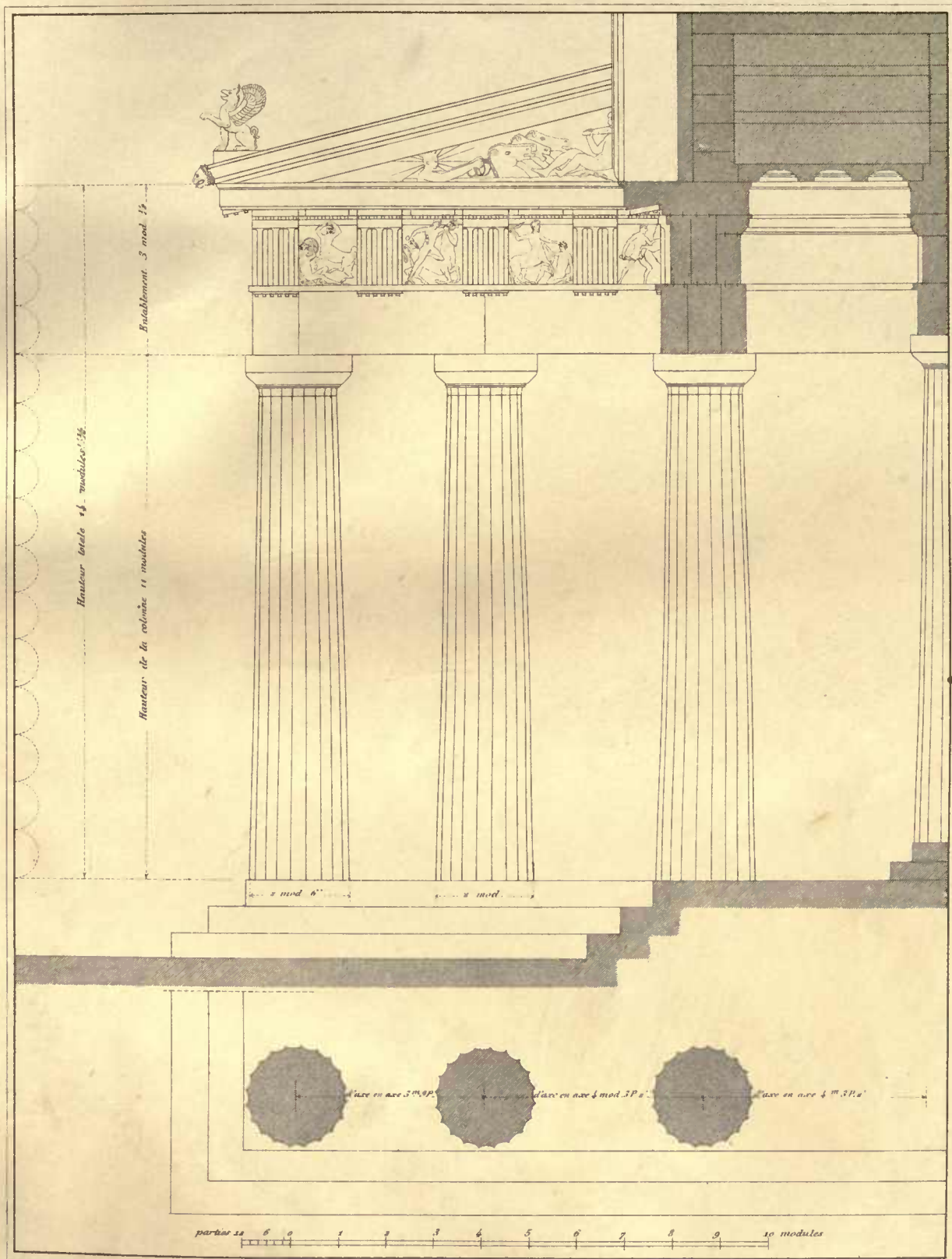
1 m 60 2 mètre

P. Enquist, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Écoles - Paris.

Strueman, sc.

La balustrade n'est autre chose qu'un appui ou accoudoir. Sa hauteur est tantôt un peu plus et tantôt un peu moins de un mètre. Elle doit être élevée sur un socle suffisant pour dégager en perspective sa base de la saillie de la corniche. Les pichetons d'arrêt servent toujours en rapport comme richesses avec l'ordre avec lequel les balustrades doivent servir. Il ne faut pas confondre une balustrade avec un attique. Une balustrade étant toujours en rapport avec l'échelle humaine tandis que l'attique est proportionné au monument. — Nous donnons ici les quatre principaux types de balustrade, la mètre et non le module étant pris pour unité de mesure.



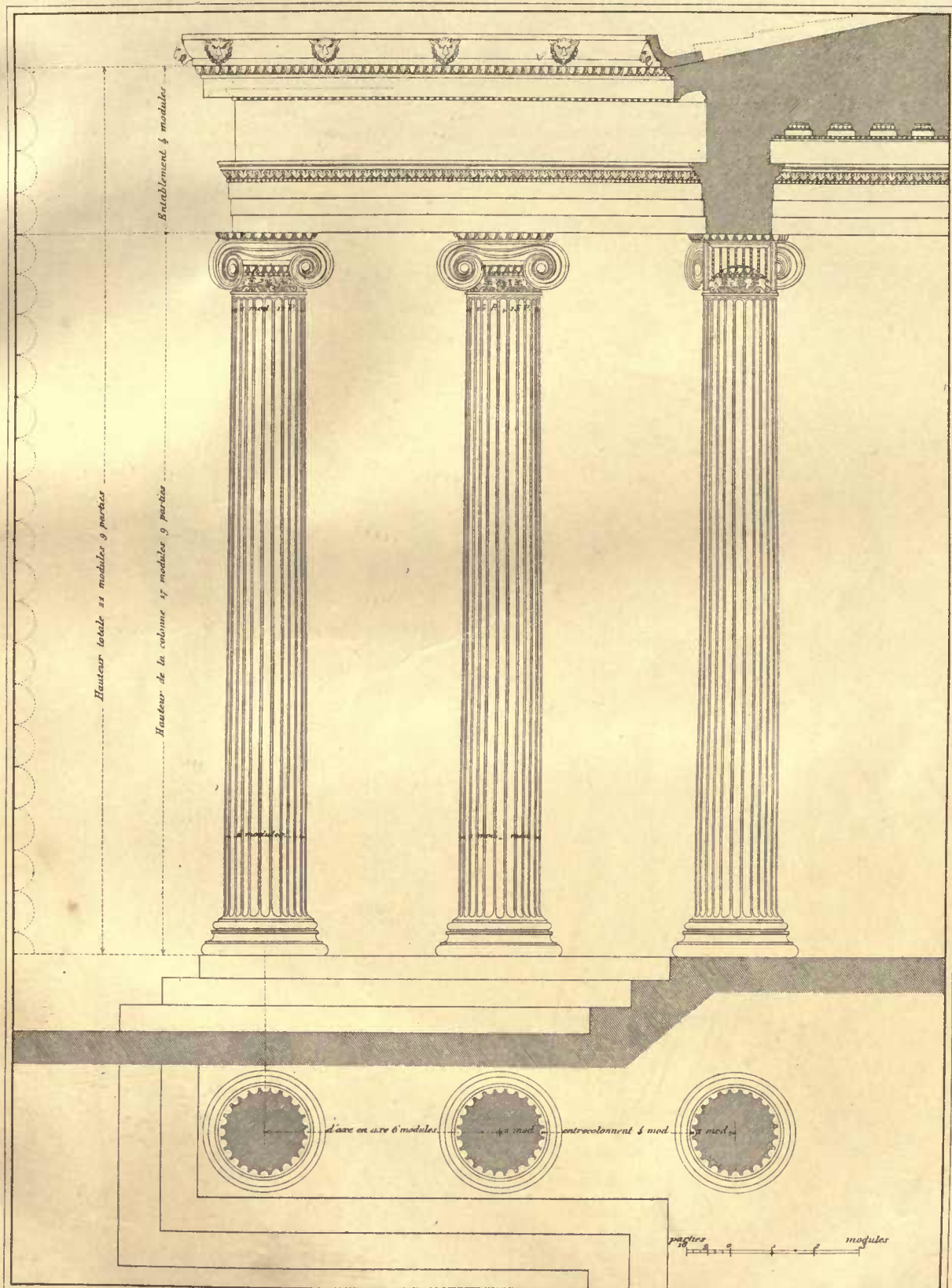
P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles - Paris

Strasmann, Sc.

Les divers temples grecs dont les restes sont parvenus jusqu'à nous étaient tous de proportions très différentes. Nous donnons ici un tracé de l'ordre dorique qui se rapproche très sensiblement du Parthénon à Athènes. Pour trouver le module de cet ordre, étant donné la hauteur à atteindre, on divisera en 14 parties 1/2, une de ces divisions sera le module. On prendra 11 modules pour la colonne et 3 modules 3/4 pour l'entablement. Pour le tracé du détail on se reportera à la planche 47.

On remarquera que comme pour les autres ordres doriques que nous avons donné au début, nous avons divisé le module en 12 parties et pour pouvoir donner les mesures des éléments plus fins, subdivisé chacune de ces parties en 12 minutes.

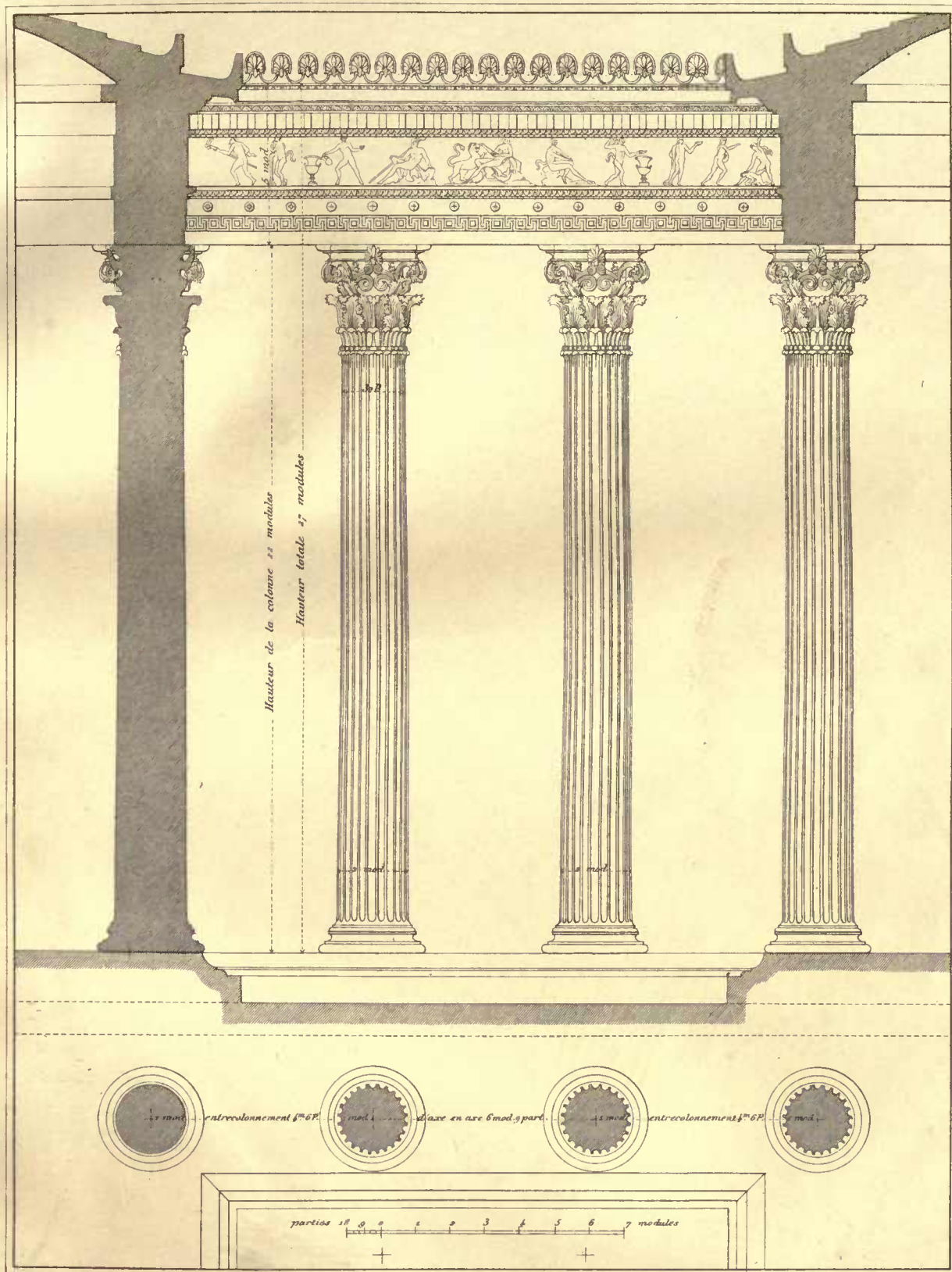


P. Esquisse, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles - Paris.

Strassmann, Sc.

Pour dessiner l'entrecolonnement Ionique Grec on divisera la hauteur en 21 parties et demi, une de ces parties sera le module. On en prendra 4 pour l'entablement et 17 et demi pour la colonne. Le module sera divisé en 18 parties et pour les subdivisions chacune de ces parties en 18 minutes. Pour les détails on se reportera à la planche 49.

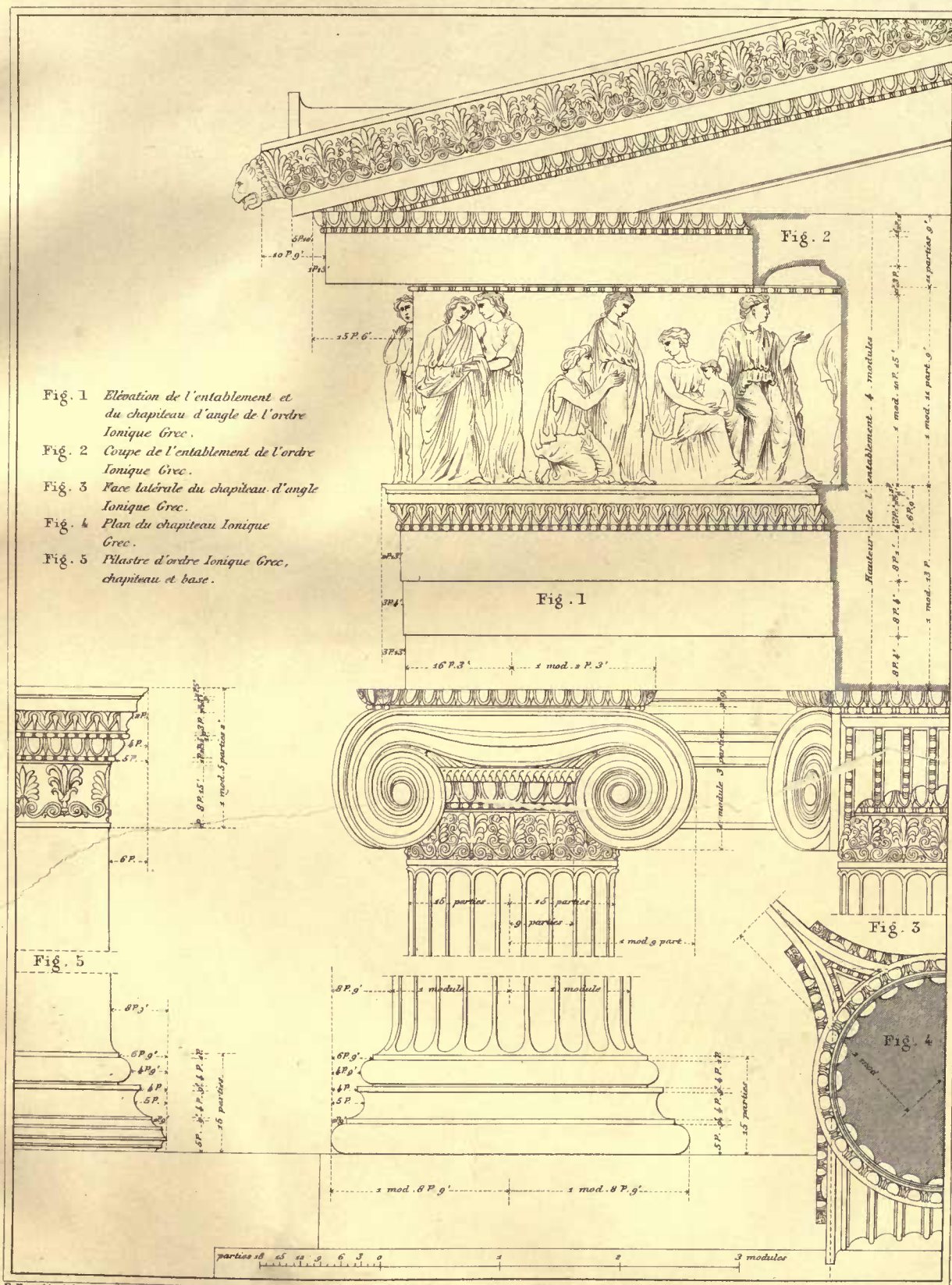


P. Esquis, 1861

CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles - Paris.

Strasmann, Sc

On ne connaît que très peu d'exemples d'ordre corinthien grec. Celui que nous donnons dérive du monument connu sous le nom de Lysicrates à Athènes. Pour dessiner un entrecolonnement corinthien grec, étant donné la hauteur on divisera cette dimension en 27 parties égales. Une de ces parties sera le module. On prendra alors 5 modules pour l'entablement et il en restera 22 pour la colonne, les colonnes s'espaceront de 9 modules et $\frac{1}{2}$ d'axe en axe. Pour les détails on se reportera à la planche 51.



P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles - Paris.

Strasmann, sc.

Les ordres Ioniques Grecs étaient loin d'être toujours semblables et sur l'acropole d'Athènes seulement nous aurions pu recueillir plusieurs exemples. Celui que nous donnons se rapproche du temple d'Érechthée dont on remarquera la grâce et la richesse. Afin de pouvoir donner des dimensions pour les divers nombres de moulures qui sont très délicates, nous avons divisé le module en 18 parties et chacune de ces parties en 18 minutes. Dans ces ordres qui étaient d'une extrême richesse, la frise était presque toujours décorée de bas-reliefs.

Fig. 1

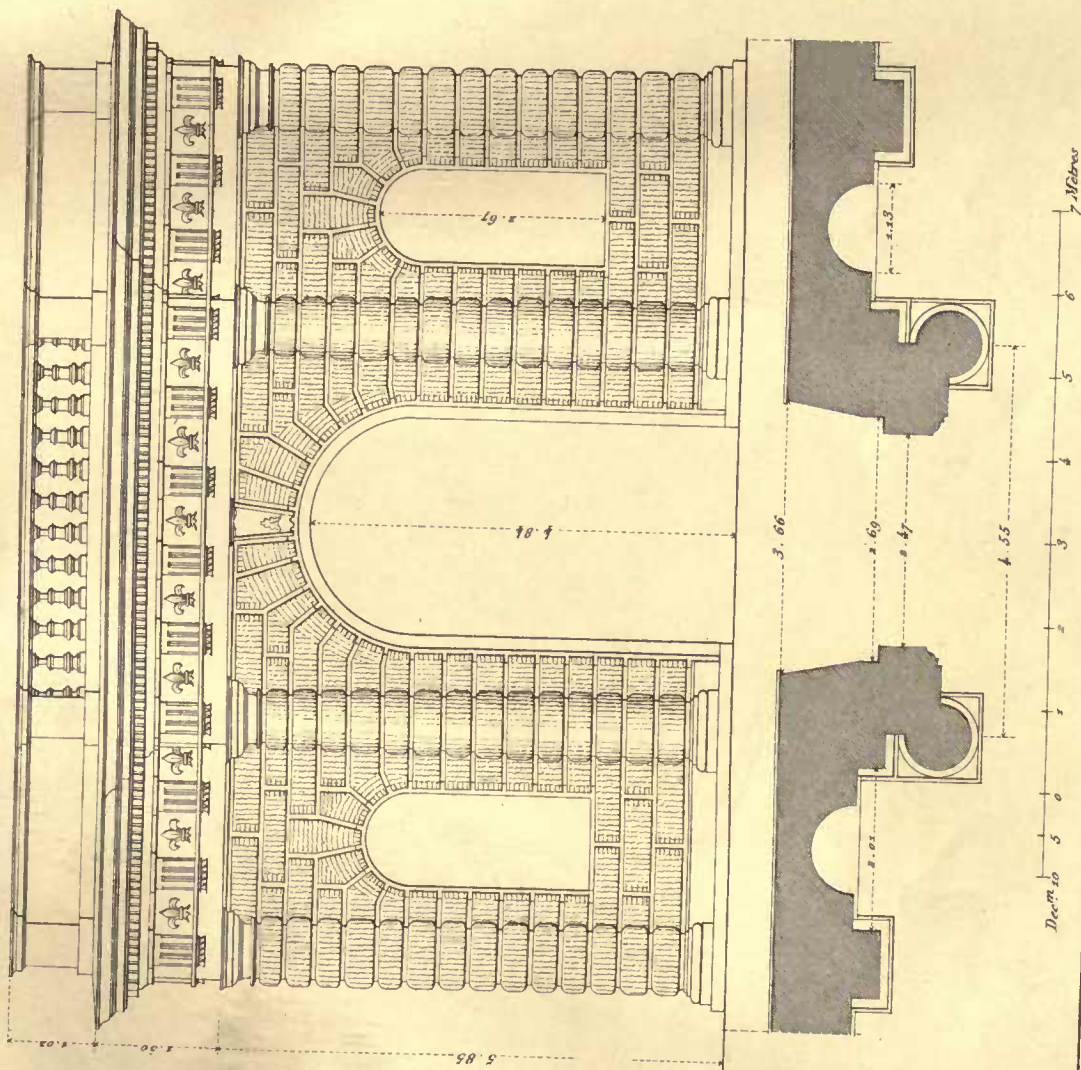
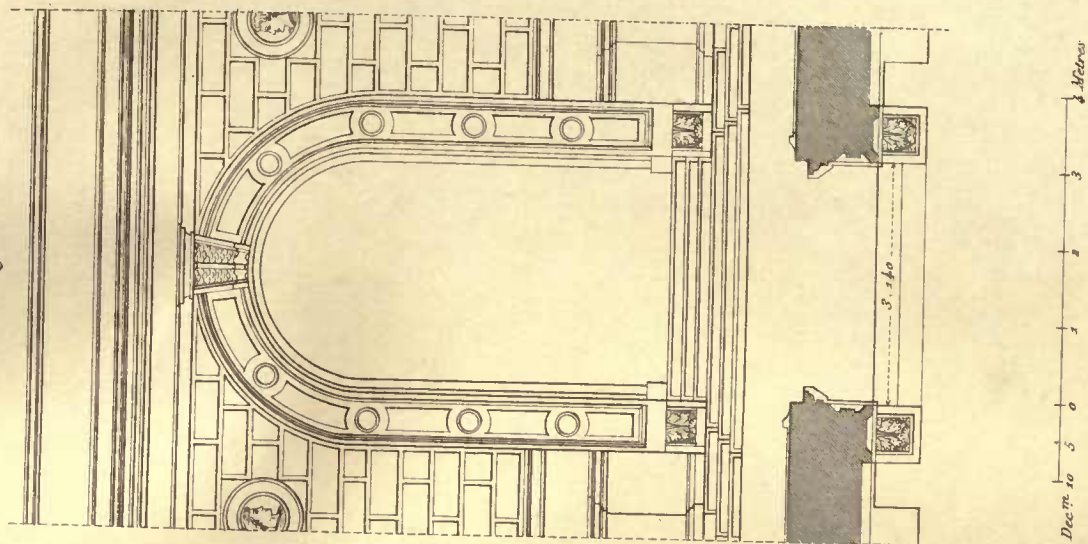


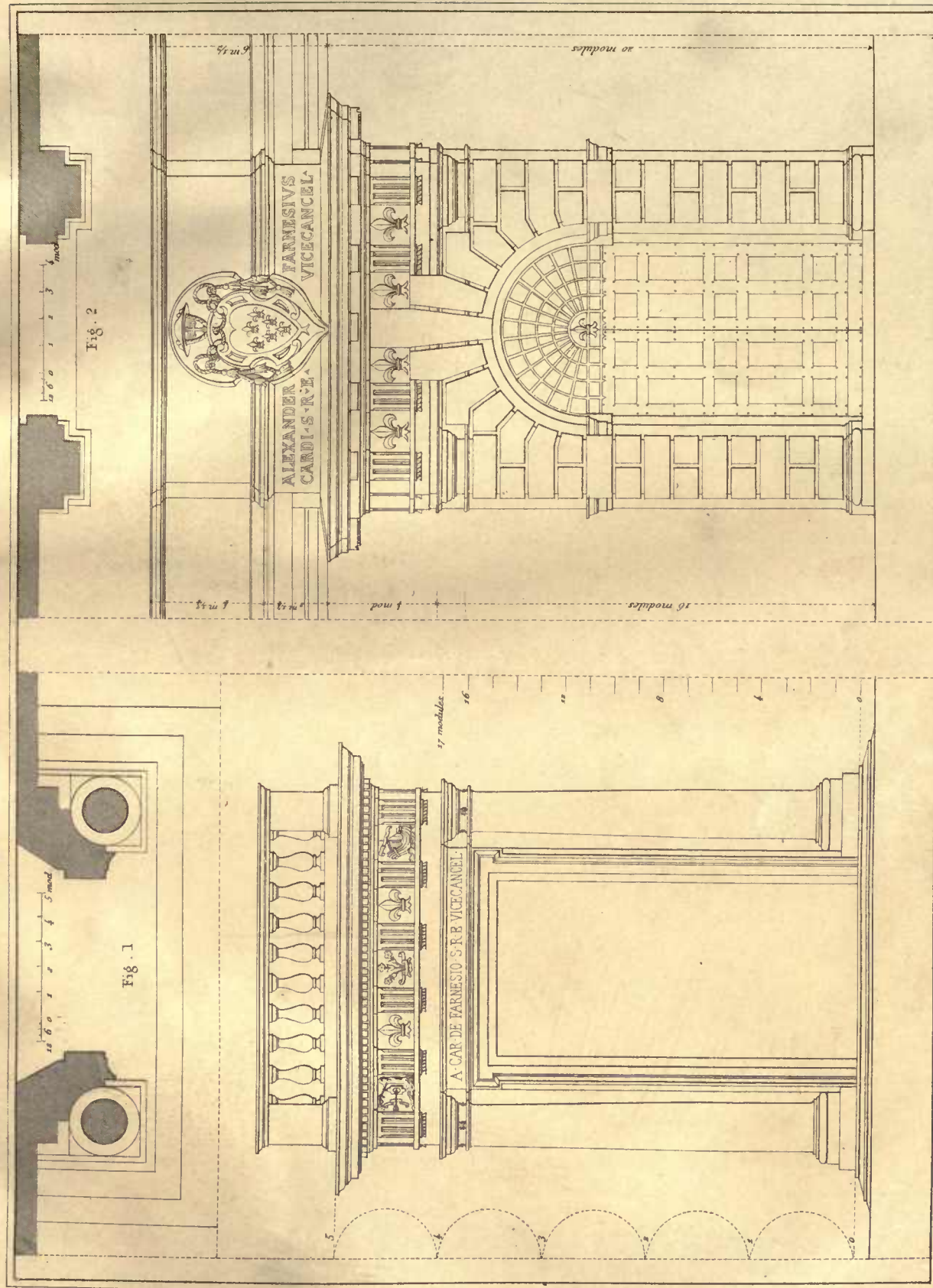
Fig. 2



P. Esquié, del.

Cette planche représente Fig. 1 la porte d'entrée du Palais Parnasse, au Mont Palatin et construite par Vignole en style rustique. La fig. 2 représente la porte d'entrée des Musées de l'école des Beaux-Arts et dont M. Dubon est l'architecte.

Benmann, Sc.



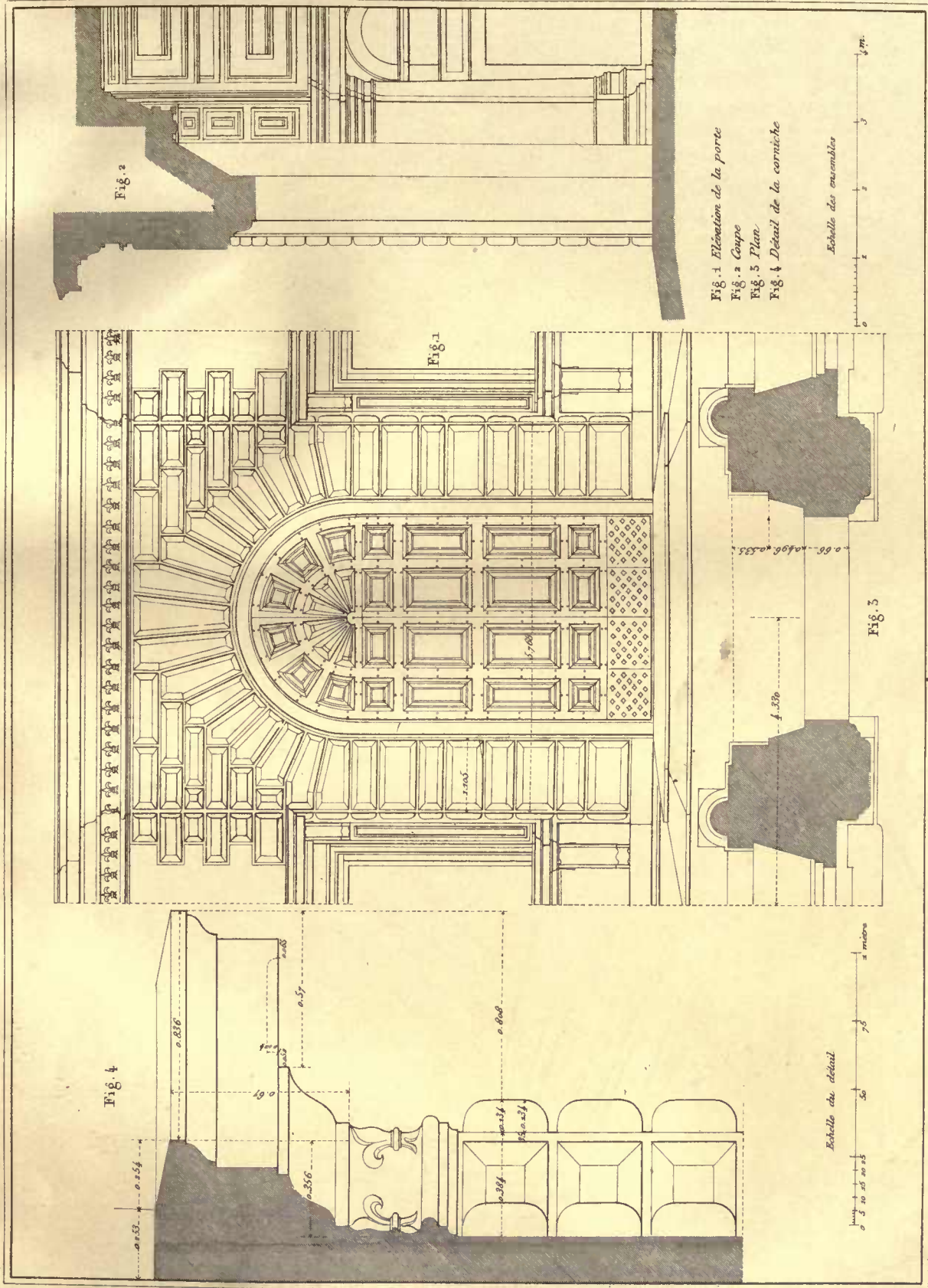
P. Bagné, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Écoles, Paris.

Strasbourg, Sc.

La figure 1 représente une porte destinée par l'ignoble au Palais de la Chancellerie et qui ne fut pas exécutée. On remarquera que la largeur égale sensiblement à la moitié de la hauteur. Le chambranle est enroulé le huitième de la largeur de l'ouverture.

La figure 2 représente la porte du Palais de Cyprien et est aussi élé à l'ignoble. La porte a en hauteur le double de sa largeur; les pilastres ont huit diamètres et l'entablement le quart de la hauteur du pilastre.



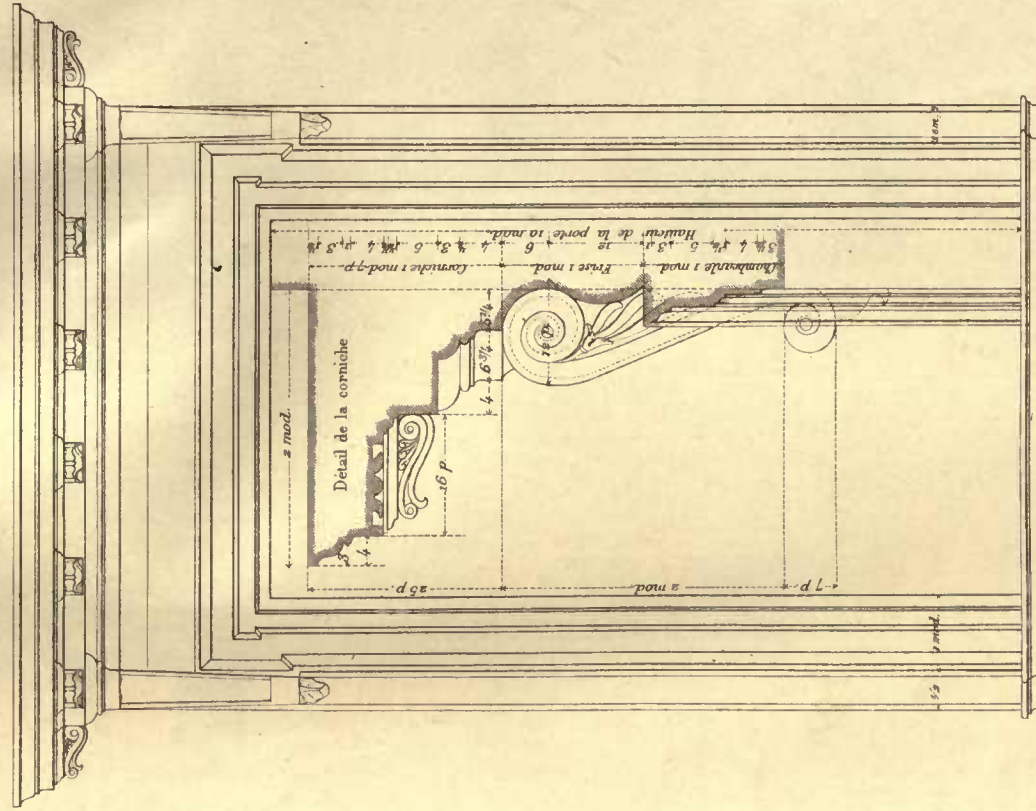
P. Esquisse del

Comme exemple de porte circulaire à basage, nous donnons l'entrée du Palais Farnèse à Rome. La saillie de la corniche est modifiée par le balcon en pierre placé au dessus mais dont nous n'avons pas rendu compte dans notre dessin.

CHARLES SCHMID ÉDITEUR, 51, Rue des Écoles - Paris.

Vermeulen, 16.

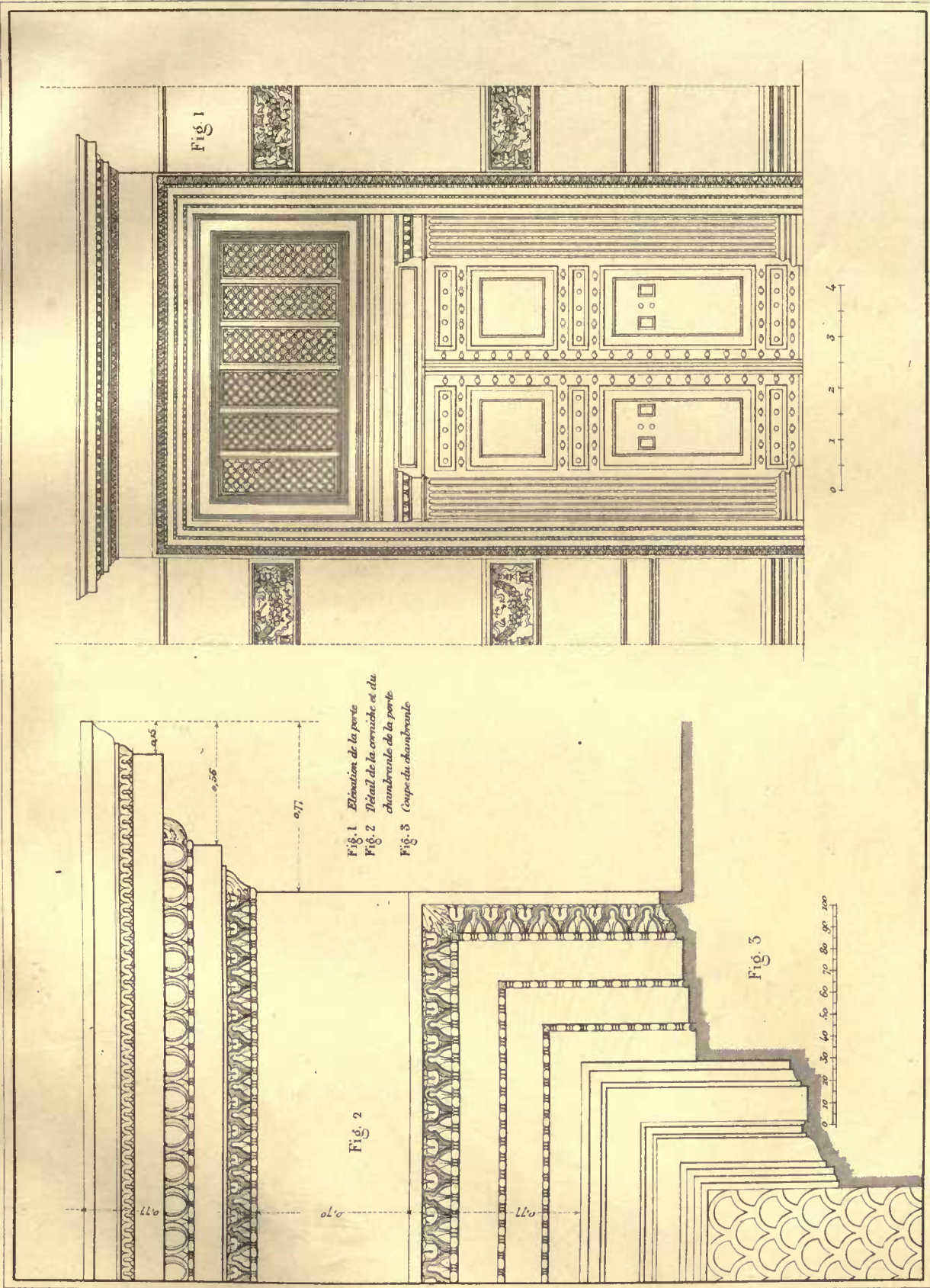
Fig. 2



Strassmann, So.

Attée : planche montrant la différence d'une porte intérieure et d'une porte extérieure de forme à peu près semblable. *Les figures N°1 représente une porte du 1^{er} étage du Palais National élevée d'après les dessins de l'ingénieur CHARLES SCHMID, ÉDITEUR, 6, Rue des Roques - Paris.*

La fig N°2 représente la porte d'entrée de l'Église St Laurent in Tarnose d'après l'ingénieur. Pour sa richesse cette porte seconde très bien avec l'ordre corinthien.

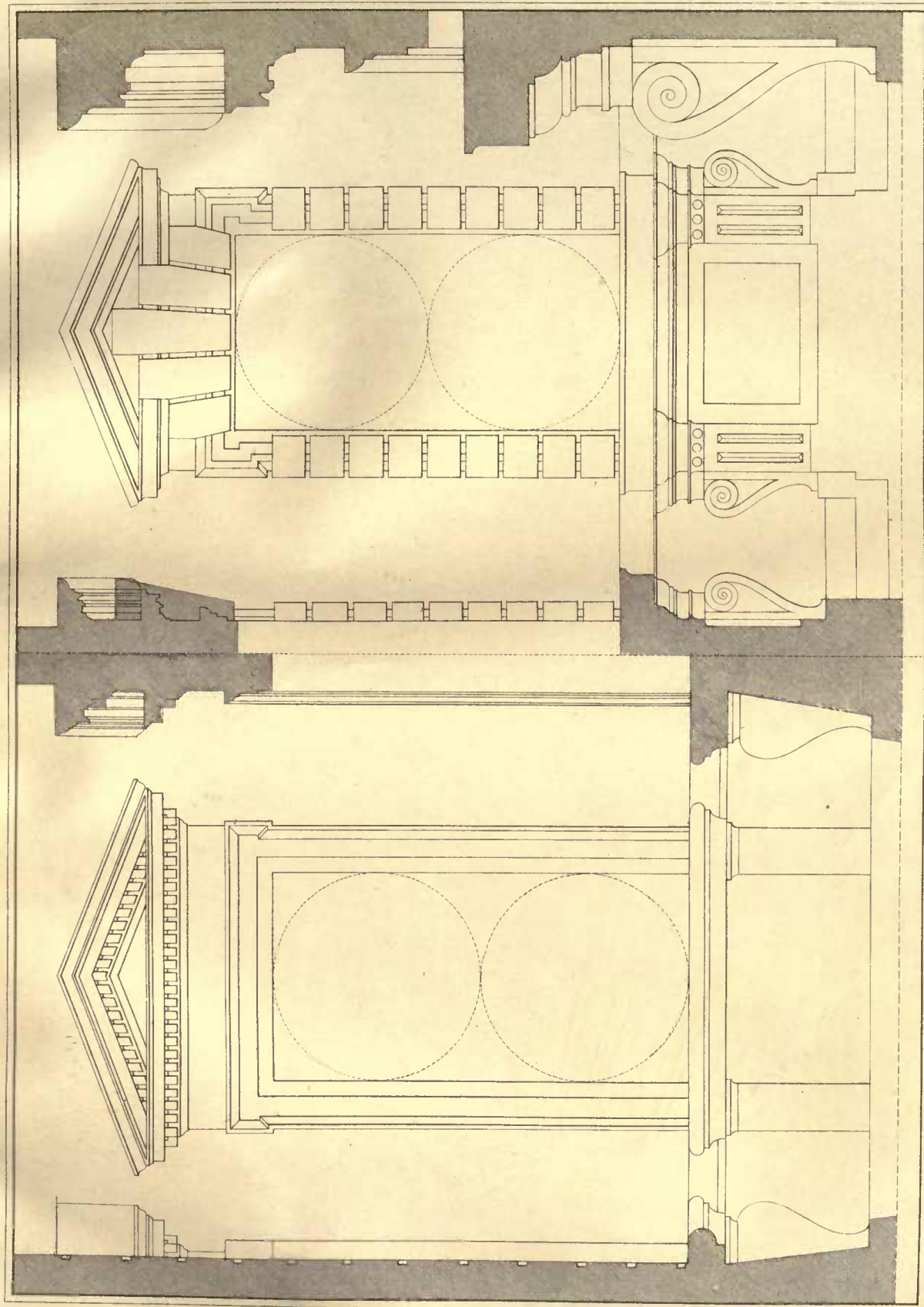


P. Esquié, del.

CHARLES SCHMID, EDITEUR, 51, Rue des Beaux-Arts, Paris.

Cette porte, finit partie du monument dit Panthéon II est élevée que le portique précèdent la colonne et dont cette porte avec portaux en bronze, finit partie, a été construite au temps d'Agrippa.

Strasbourg, 18.



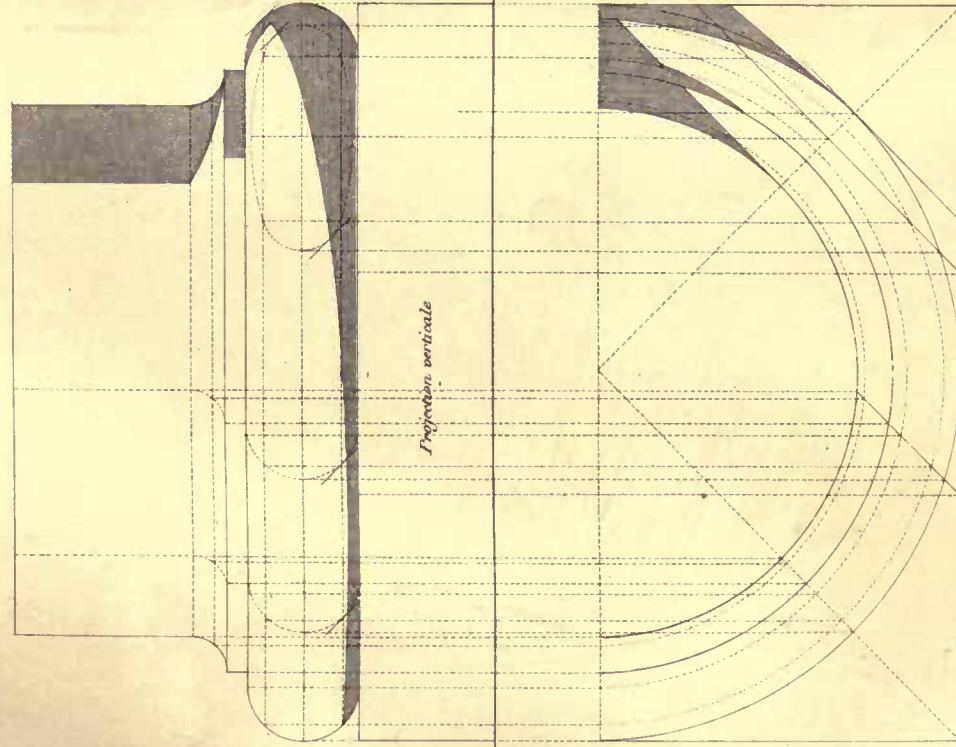
P. Bignon, del.

Dans la fig. 201 nous avons représenté la fenêtre du rez-de-chaussée du palais de Caprarola, la hauteur est le double de la largeur et la chambre au-dessus de l'ouverture. Nous donnons, fig. 2 un exemple de fenêtre d'ordre rustique située au rez-de-chaussée du bâtiment d'entrée de la Figne du Pape Jules II à Rome. La hauteur est aussi le double de la largeur.

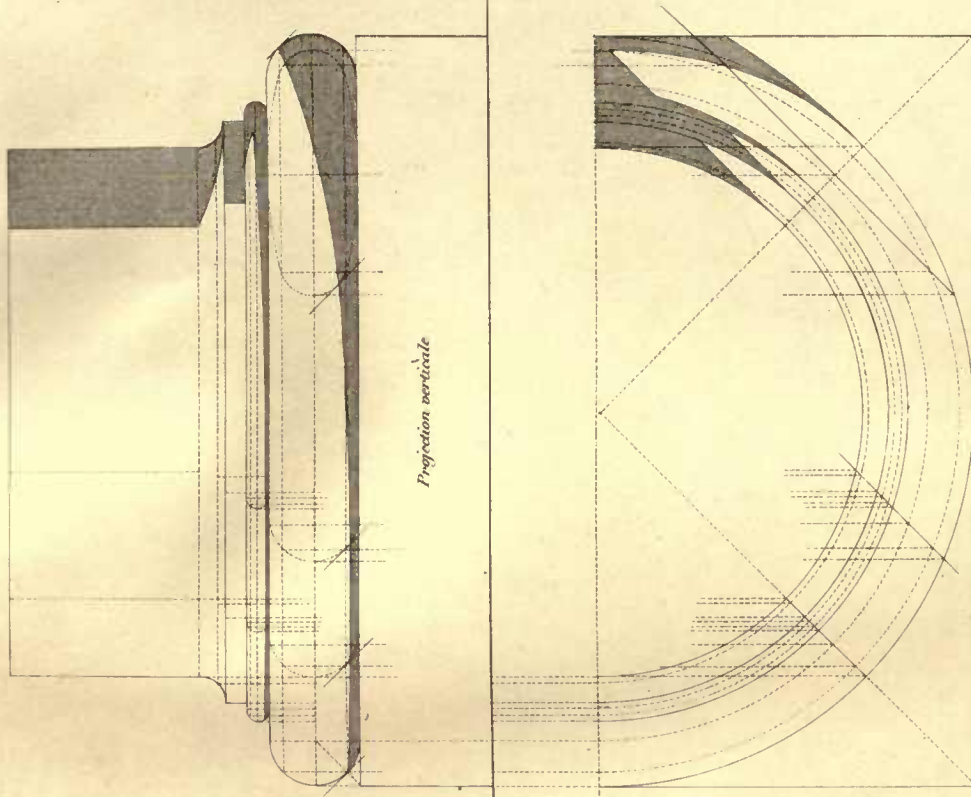
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Strasbourg, Sc.

BASE TOSCANE



BASE DORIQUE

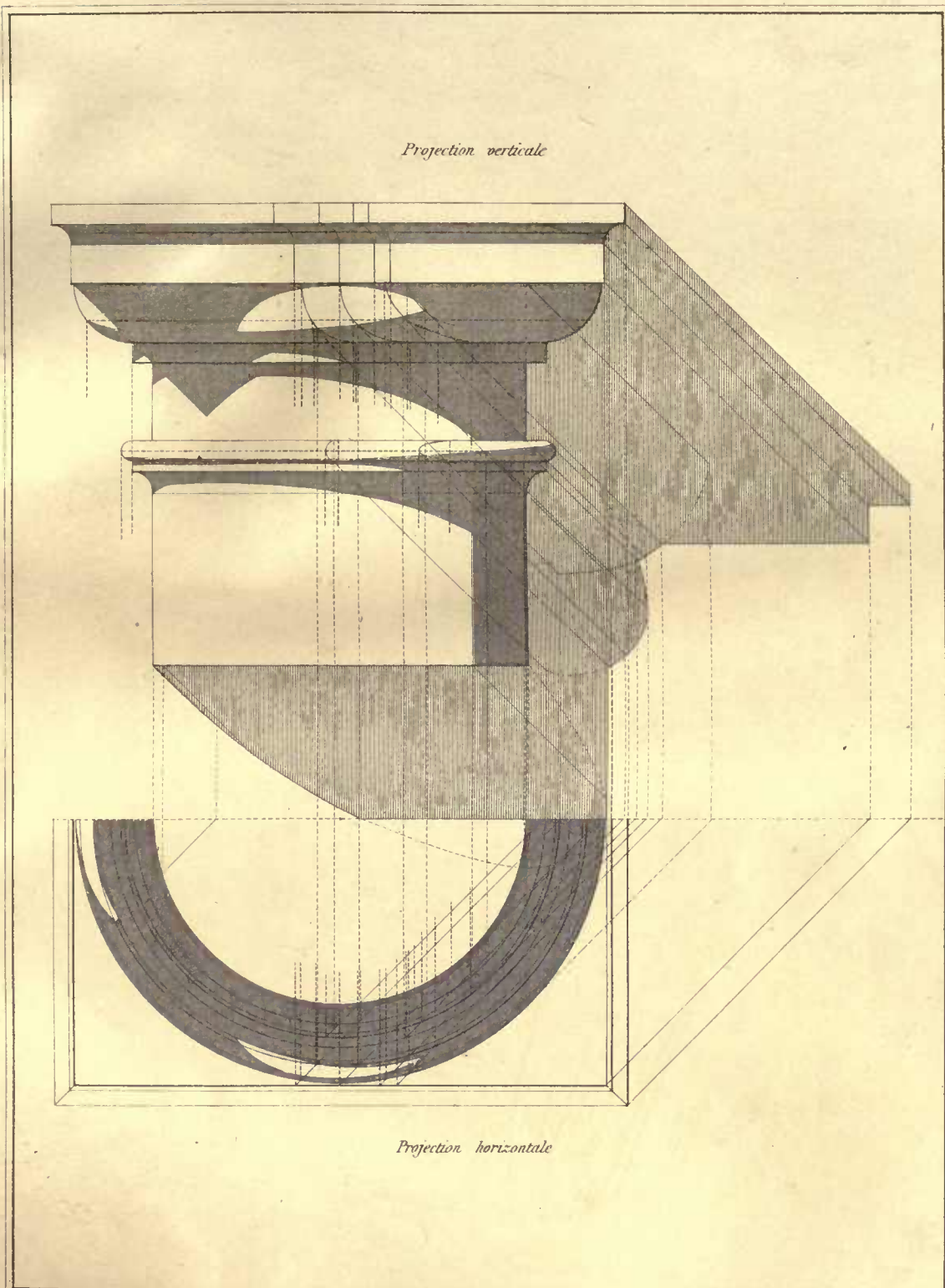


F. Enquist, del.

CHARLES SCHMID, ÉDITEUR 51, Rue des Écoles - Paris.

Pour obtenir l'ombre et de l'humidité des bases toscanes et doriques il faut couper ces bases par des plans verticaux parallèles aux rayons de lumière, on obtiendra ainsi des courbes de section à l'aide desquelles on pourra tracer point par point les limites d'ombre et de lumière en leur menant des tangentes à 45° et en les prolongeant jusqu'à leur rencontre avec les courbes de section. Pour obtenir ces sections par des plans verticaux à 45° on sera obligé pour les surfaces courbes de considérer les rencontres de ces plans verticaux à 45° avec des sections de mêmes surfaces par des plans horizontaux. L'inspection de la figure fera d'ailleurs comprendre le tracé.

Braunauer, sc.

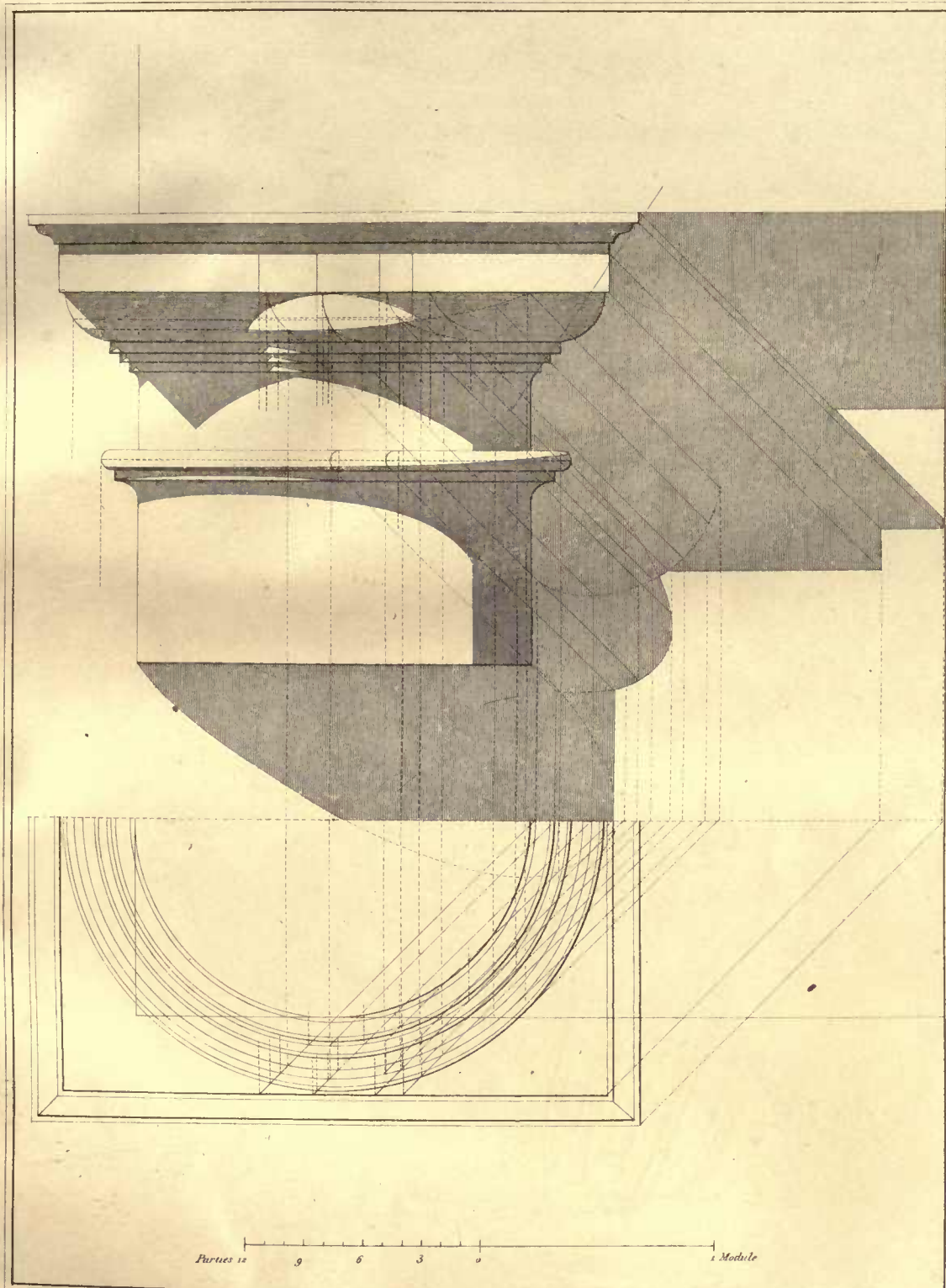


P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Fossés — Paris.

Strasmann, Sc.

Pour obtenir les ombres du chapiteau on se sert du même procédé employé pour la base. C'est-à-dire en se servant de sections par une suite de plans verticaux coupant le chapiteau suivant le parallélisme du rayon lumineux. Nous avons donné outre les ombres propres du chapiteau, celles qui seraient portées par l'ensemble sur un plan vertical passant par l'axe.



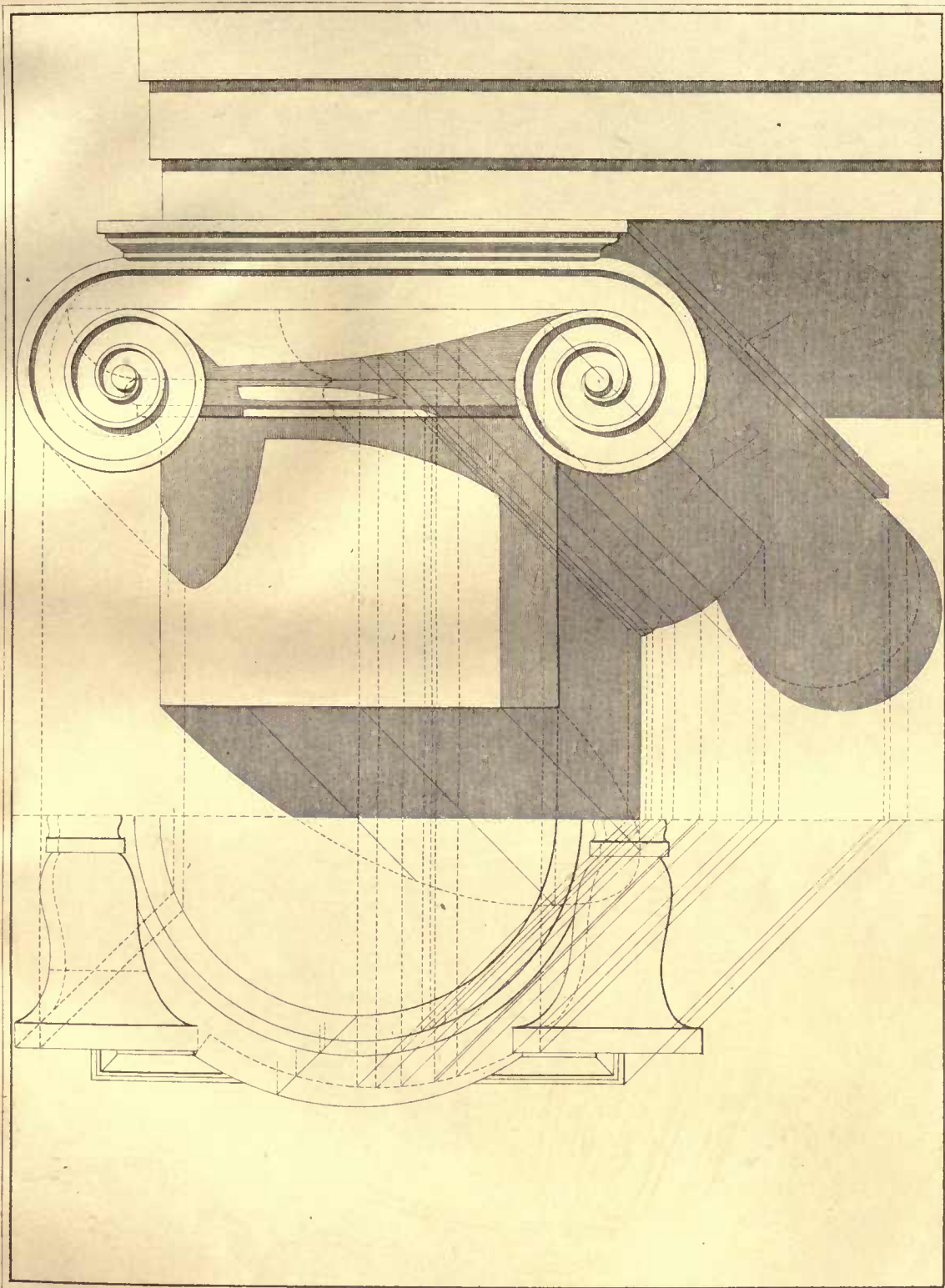
P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles — Paris.

Strassmann, Sc.

Même procédé que pour le chapiteau ionique. Le chapiteau surmonté de l'architrave porterait ombre d'après cette planche sur un plan vertical, parallèle au tableau et passant par l'axe de la colonne.

F. MATHEIUS, JR.

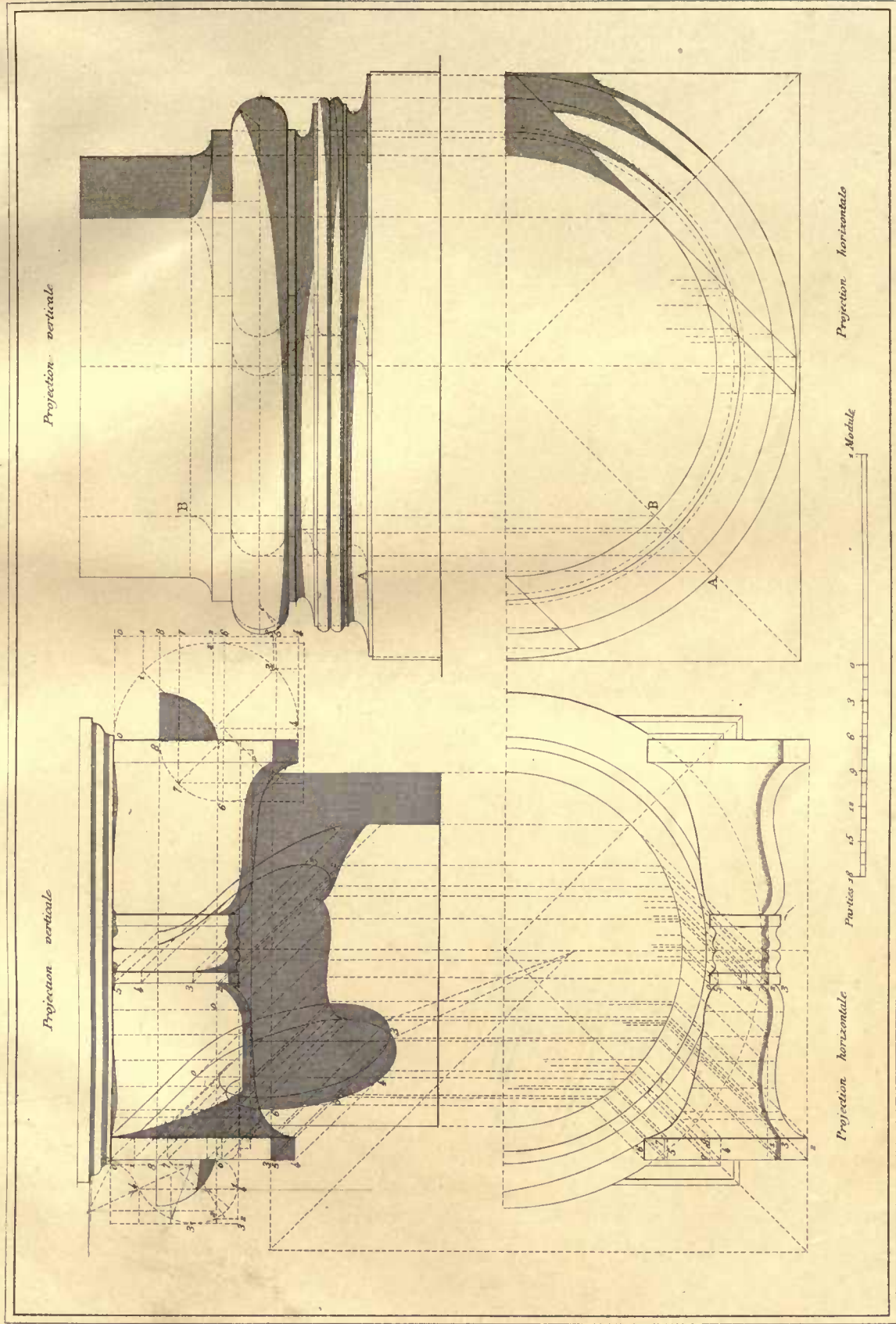


P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Beaux-Arts - Paris.

Strasmann, sc.

Sur cette planche nous avons indiqué les ombres du chapiteau Ionique vu de face et les ombres portées par l'ensemble sur un plan vertical parallèle au tableau et passant par l'axe de la colonne. La méthode employée pour obtenir les divers points de l'ombre est toujours la même.



F. Esquisse del.

CHARLES SCHMID, ÉDITEUR 51, Rue des Beaux-Arts, Paris

Sturmann, Sc.

Pour le chapiteau comme les limites de l'ombre portée se composent de l'intersection des bandes de la volute et de la surface, ainsi que de l'ombre propre du chapiteau, il a fallu tracer séparément les courbes des bandes pour obtenir en plan les projections horizontales, et en élévation les projections verticales de leurs principaux points, ainsi que de l'ombre propre des volutes comme: il est indiqué par les chiffres.

Pour la base, il faut encore employer la méthode des tangentes verticales comme A B, sur chacune desquelles les tangentes parallèles à la direction de la lumière donneront les limites des ombres propres des surfaces concaves; et les sécantes, celles des ombres portées sur les surfaces convexes.

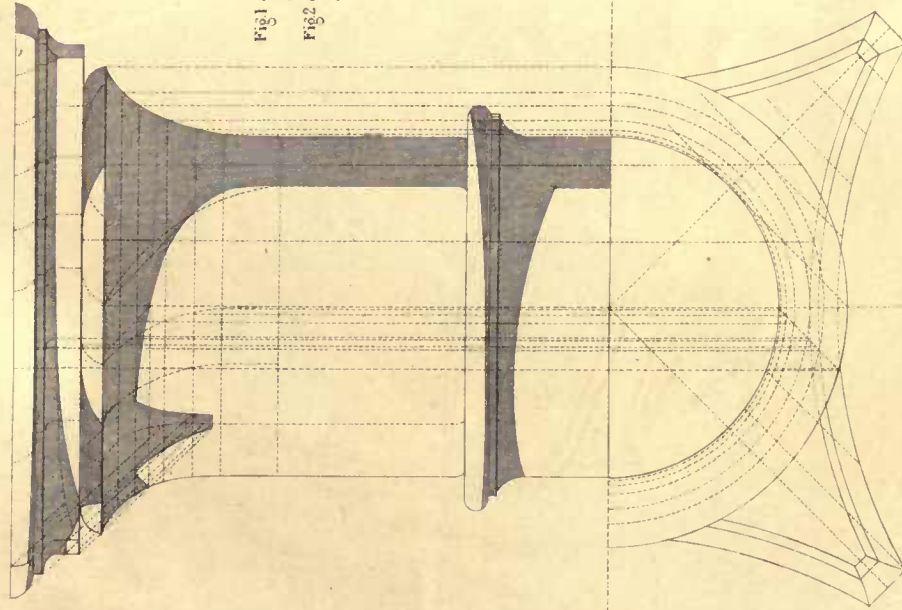
Fig. 1^{ère}

Fig. 2

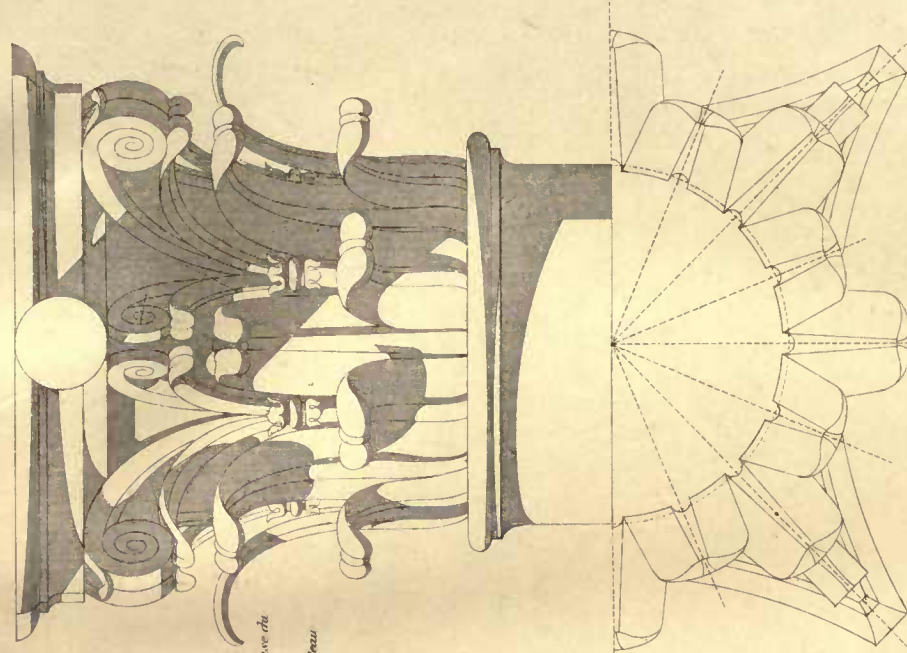


Fig. 1 Ombres du tailloir et du vase du
chapiteau corinthien
Fig. 2 Ombres complètes du chapiteau
d'ordre corinthien

F. Faqué del.

CHARLES SCHMID, EDITEUR, 51, Rue des Écoles, Paris.

On obtient l'ombre de la figure 1 en faisant une série de sections par des plans verticaux parallèles à la direction de la lumière. Pour la figure 2 il faut étudier isolément l'ombre de chacun des ornements du chapiteau afin d'arriver à la construction exacte de l'ombre générale. Nous n'en donnons ici que le résultat, sans

S. BERNARDIN, sc.

Pour déterminer les ombres portées par la corniche on trace d'abord les lignes AC et BD puis les lignes horizontales C'E', D'G puis en menant des lignes à 45° par les points E'F'G on obtiendra les points E'F'G'.

Pour tracer l'ombre du fronton on déterminera d'abord les lignes MPON, RS, XY en faisant des sections par des plans verticaux parallèles aux rayons lumineux on obtiendra ensuite les limites d'ombres en procédant comme pour la corniche.

Pour la fig. 2 le procédé est le même on aura seulement à chercher un plus grand nombre de points pour obtenir les courbes

Fig. 2

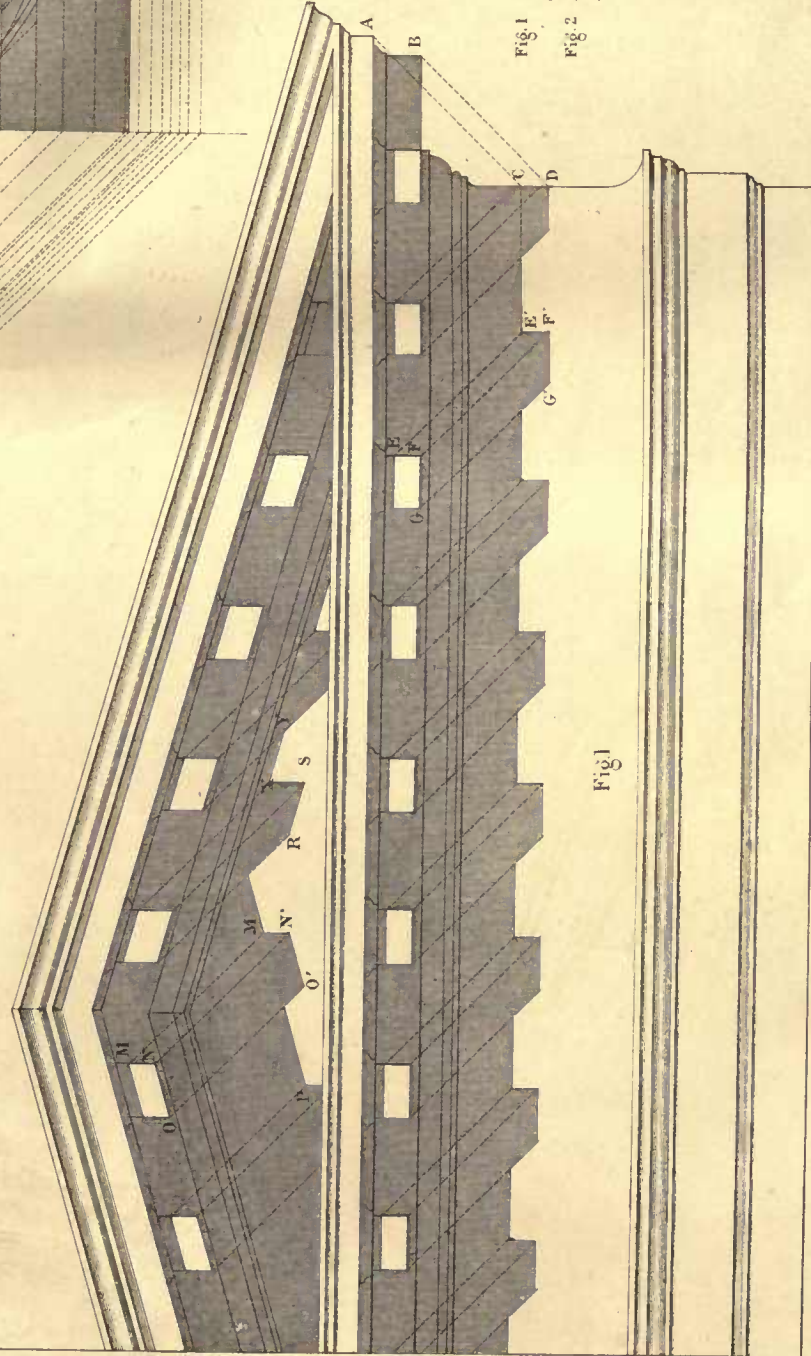
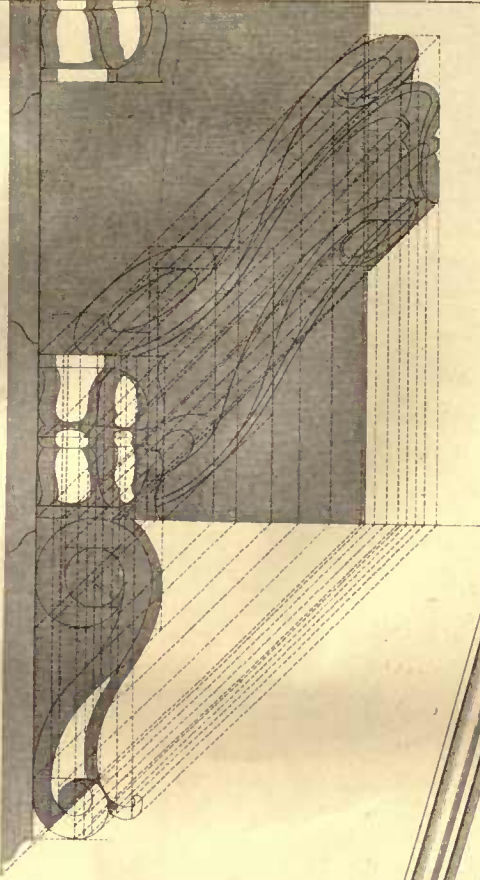
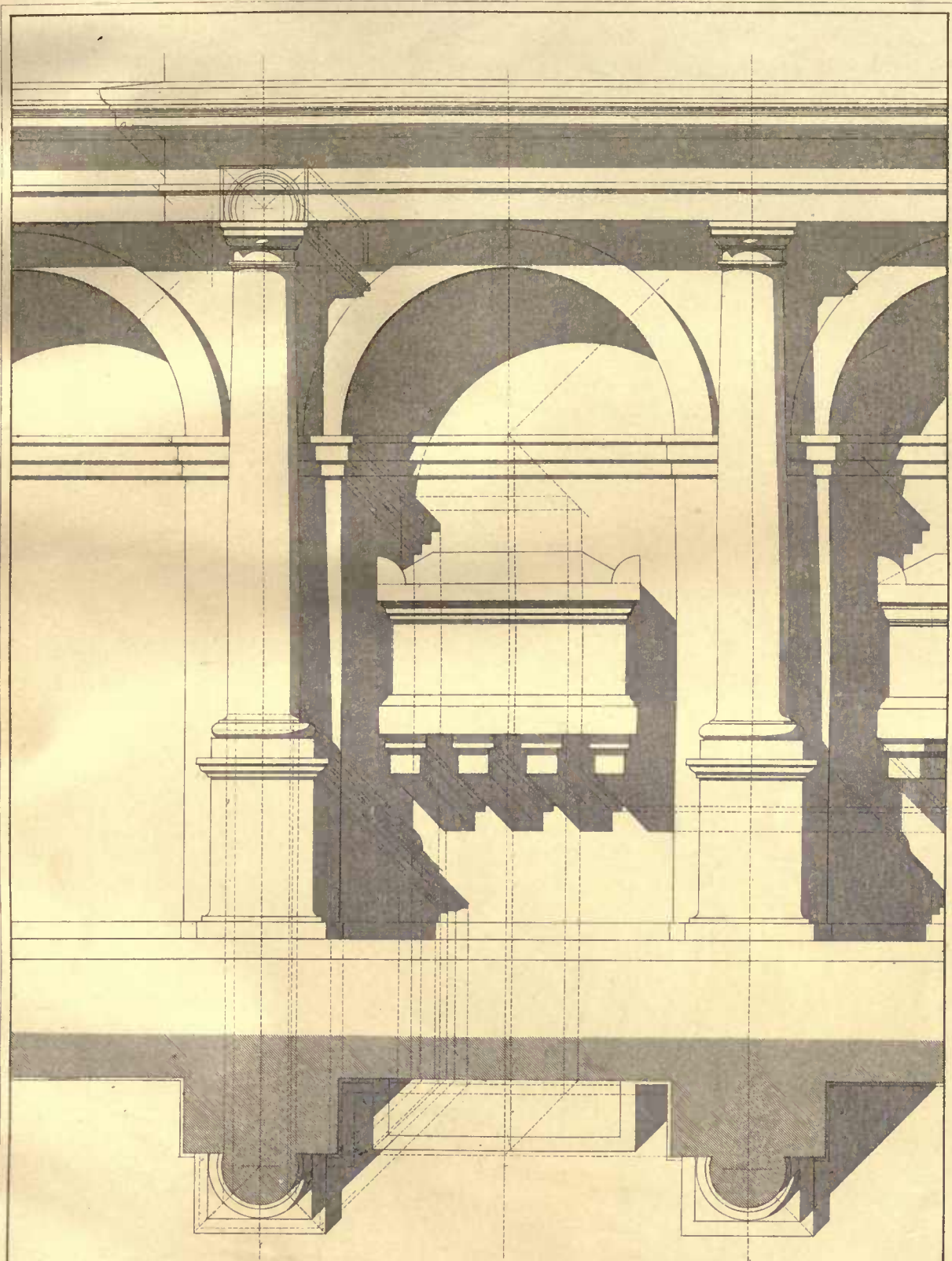
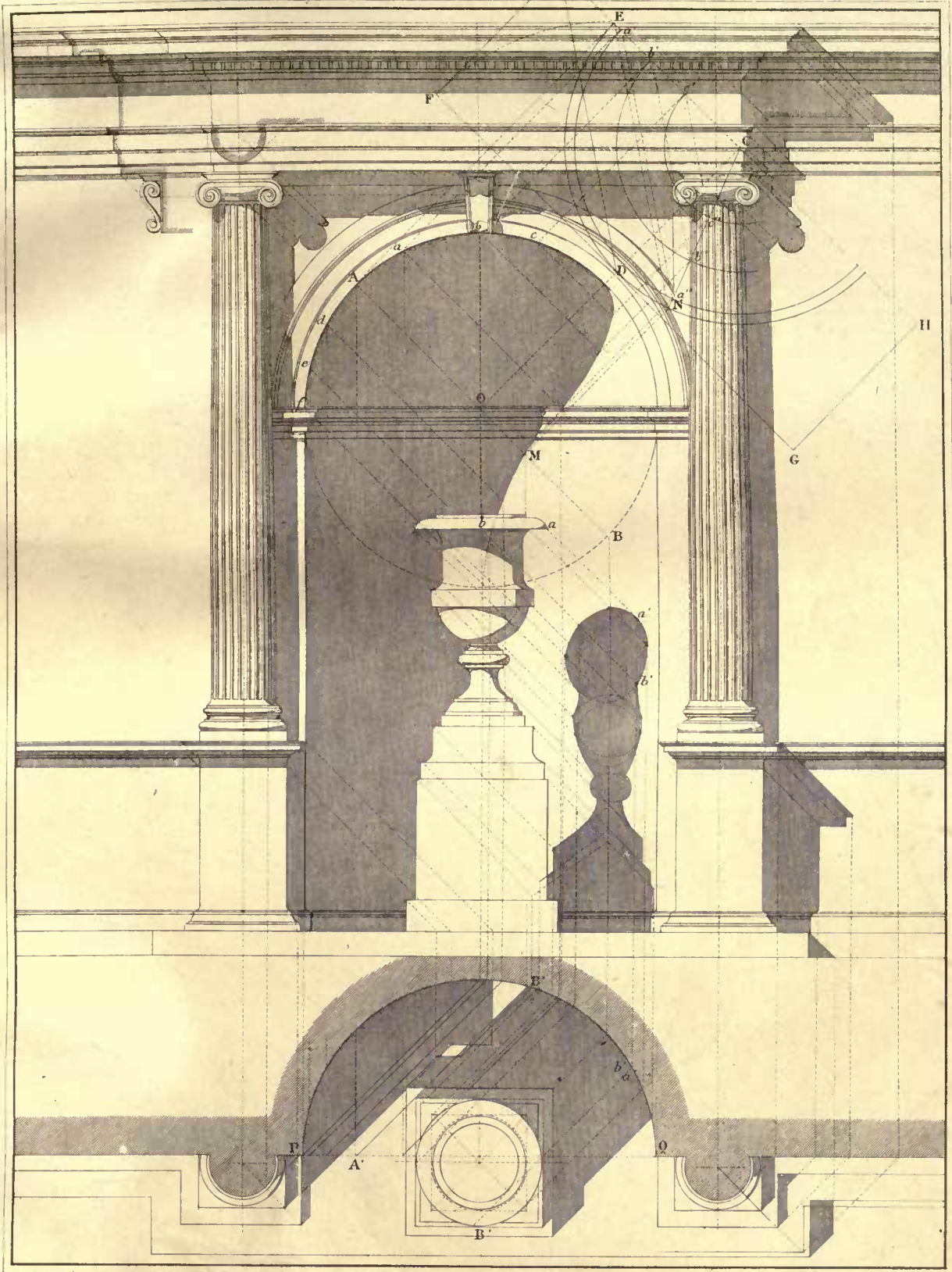


Fig. 1 Etude des ombres portées d'un fronton à modillons

Fig. 2 Etude des ombres d'une corniche d'ordre corinthien



On obtient les ombres portées de ce portique en menant des lignes à 45° par tous les points pouvant porter ombre que l'on arrêtera dans le plan aux plans sur lesquels les ombres doivent se projeter. De ces points on élèvera des verticales dont les intersections avec les lignes à 45° tirées des points correspondants de l'élévation donneront les points successifs des ombres à obtenir. Pour le détail des ombres portées par les chapiteaux on se reportera au détail donné.

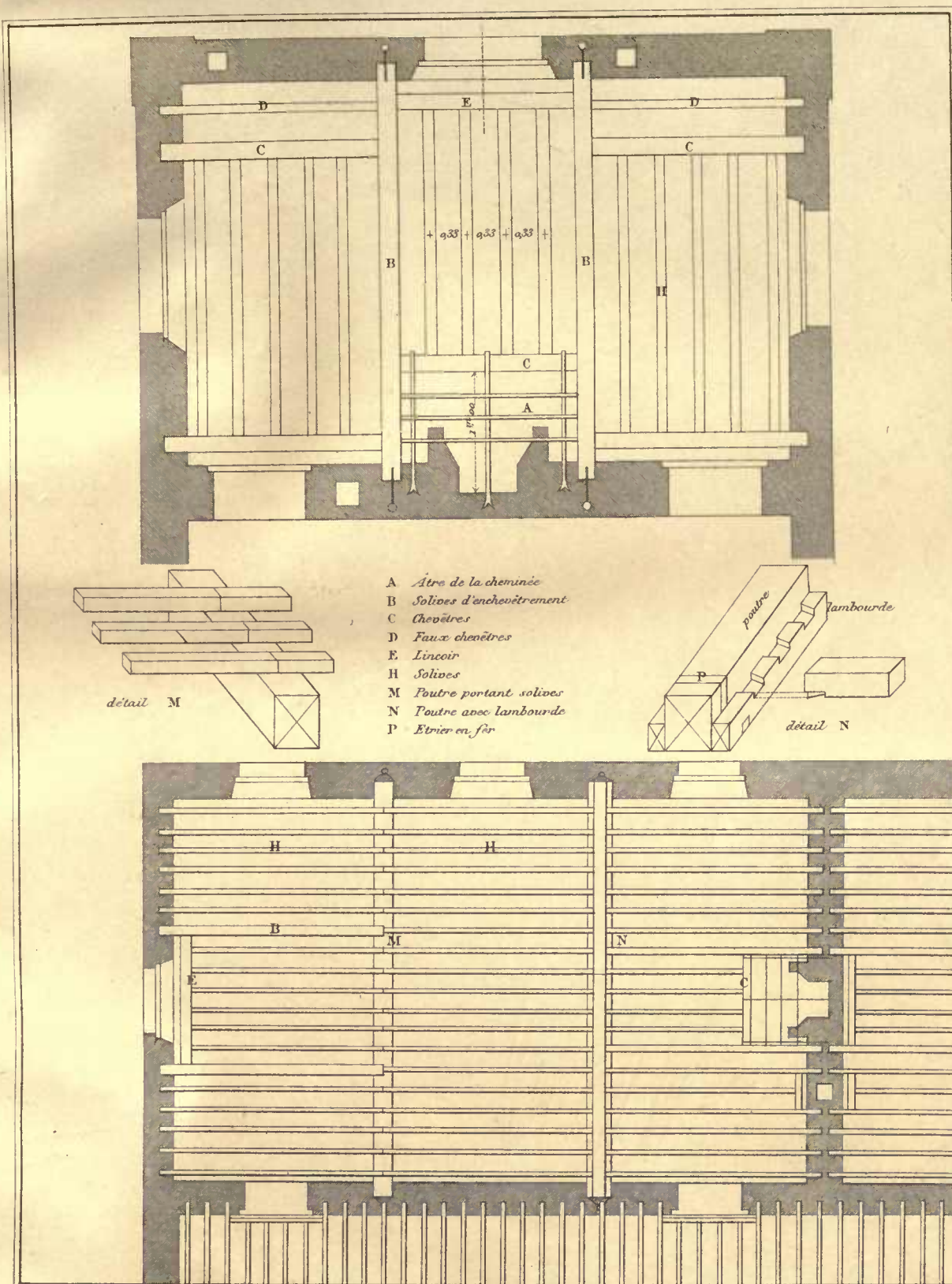


P. Esquis, del.

CHARLES SCHMID, ENTEUR, 31, Rue des Ecoles, Paris.

Straumann sc.

On obtient les ombres de ce portique par le même procédé que nous avons employé dans les planches qui précèdent. Nous avons indiqué de plus l'ombre d'une niche afin de donner le tracé de l'ombre, pour l'obtenir il faut mener par le centre O du cercle qui forme la niche, une ligne à 45° qui rencontrera les deux côtés de ce cercle en deux points, A et B, perpendiculairement à cette ligne et par le centre de la niche on mène une ligne OC qui rencontrera une ligne IH parallèle à AB au point C, qui sera le centre d'un cercle de même diamètre que la niche, puis du point D comme centre avec le rayon DE on décrit un arc de cercle, jusqu'à la rencontre de la ligne FDG, qui est elle-même parallèle à AB, puis par le point F on élève une perpendiculaire à FG qui rencontrera la ligne IH au point I et en joignant les points I et D, par une droite, cette ligne qui est la diagonale d'un cube dont le côté est égal au rayon de la niche est en même temps la direction du rayon de lumière dans le plan rabattu, ayant fait cette première opération, il faut abaisser le point A sur la ligne PQ en plan, en N puis par ce point mener une ligne à 45° A'B' qui rencontrera le cercle du plan de la niche au point B', élever par ce point une perpendiculaire qui rencontrera la ligne AB de l'élévation au point M, ce point sera un des points de l'ombre, par ce point M, mener une ligne parallèle à OC jusqu'à la rencontre du cercle du plan rabattu au point N, joindre les points N et C par une droite cette droite sera le tracé de l'ombre sur la sphère de la niche en rabattement on prendra maintenant des points quelconques, a, b, c, par lesquels on fera passer des lignes à 45° parallèles à AB, abaissant ensuite des perpendiculaires à la ligne IH qui les rencontreront aux points a', b', c' et par ces points on mènera des parallèles au rayon de lumière ID ces lignes couperont la ligne d'ombre NC, aux points n', b', c', jusqu'à la rencontre des lignes tracées à 45° par les points a, b, c, de l'élévation, la rencontre de ces lignes donnera des points de l'ombre en faisant passer une courbe par ces points, cette courbe sera la portion de l'ombre de la niche jusqu'au point M, on fera remarquer que cette courbe est une portion d'ellipse. Pour obtenir le reste de la courbe qui forme l'ombre, on prendra d'autres points, d, e, f, par lesquels on mènera de nouvelles lignes à 45° on projettera ensuite ces points sur la ligne PQ en plan aux points d', e', f', par ces points projetés on mènera des parallèles à A'B' jusqu'à la rencontre du cercle indiquant en plan le fond de la niche, par ces points de rencontre sur le cercle on élèvera des perpendiculaires qui couperont les lignes à 45° menées des points correspondants en élévation, ces points de section donneront les derniers points de la seconde partie de la courbe de l'ombre, cette dernière courbe est à double courbure, puisqu'elle provient de la rencontre de deux cylindres.

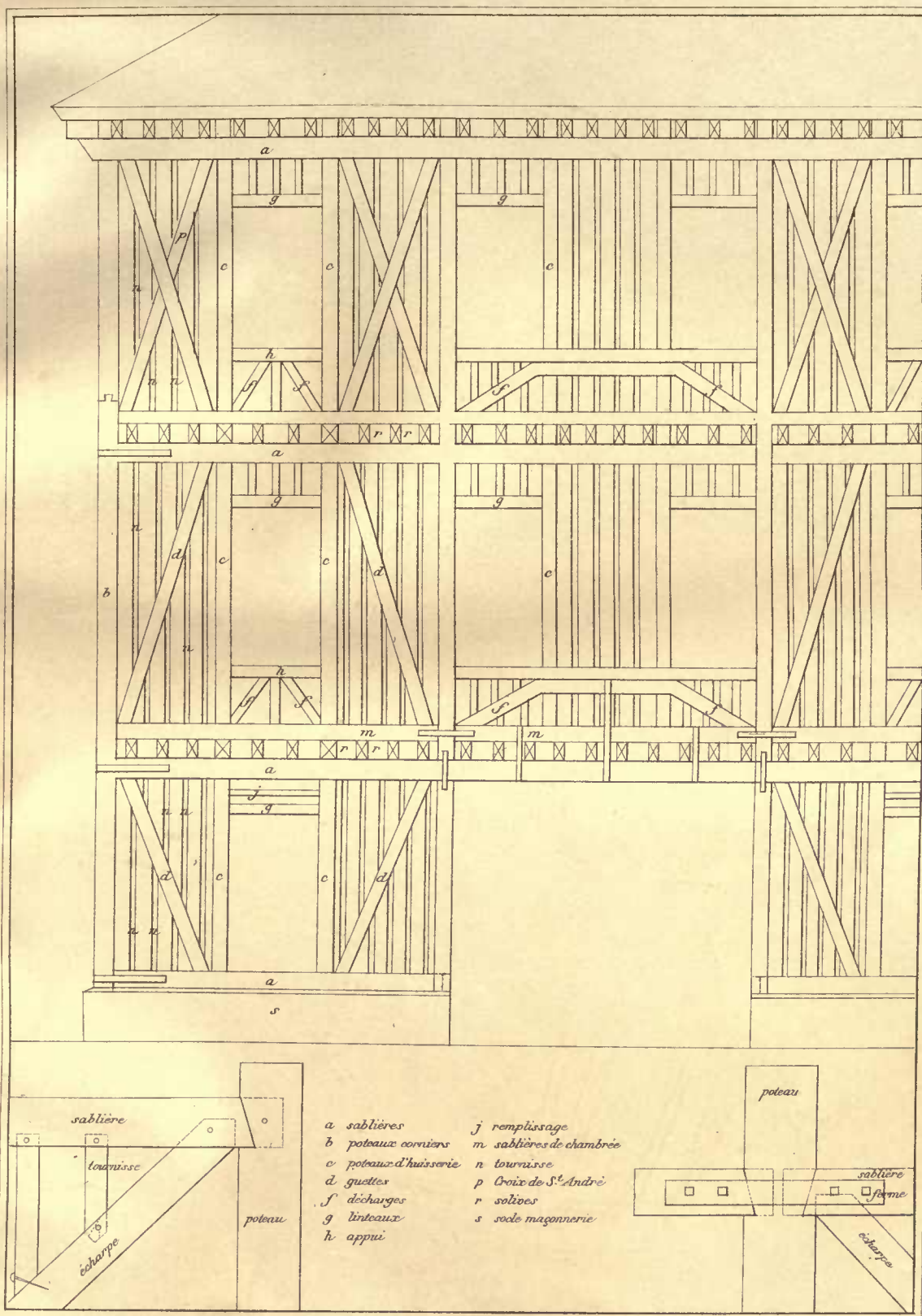


P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles - Paris.

Stramann, sc.

On nomme planchers des pans de charpente qui se placent horizontalement pour séparer les différents étages d'une construction et en supporter les aires ou parquets, les planchers se composent de 3 parties 1° le plafond, 2° la charpente proprement dite 3° le carrelage ou parquet, lorsque la pièce est de petite dimension, on n'emploie que les solives, que l'on espace généralement de 0,33 d'axe en axe. Lorsque l'espace est plus considérable, on fait porter les solives par des pièces plus fortes, qui portent le nom de poutres. Elles doivent avoir au moins 0,25 de prise dans le mur, les dimensions des bois sont proportionnées aux charges à supporter — pour la bonne conservation des bois il faut les isoler autant que possible des maçonneries et les enfermer le moins possible. Nous donnons deux exemples de planchers avec les dispositions principales que l'on peut rencontrer.

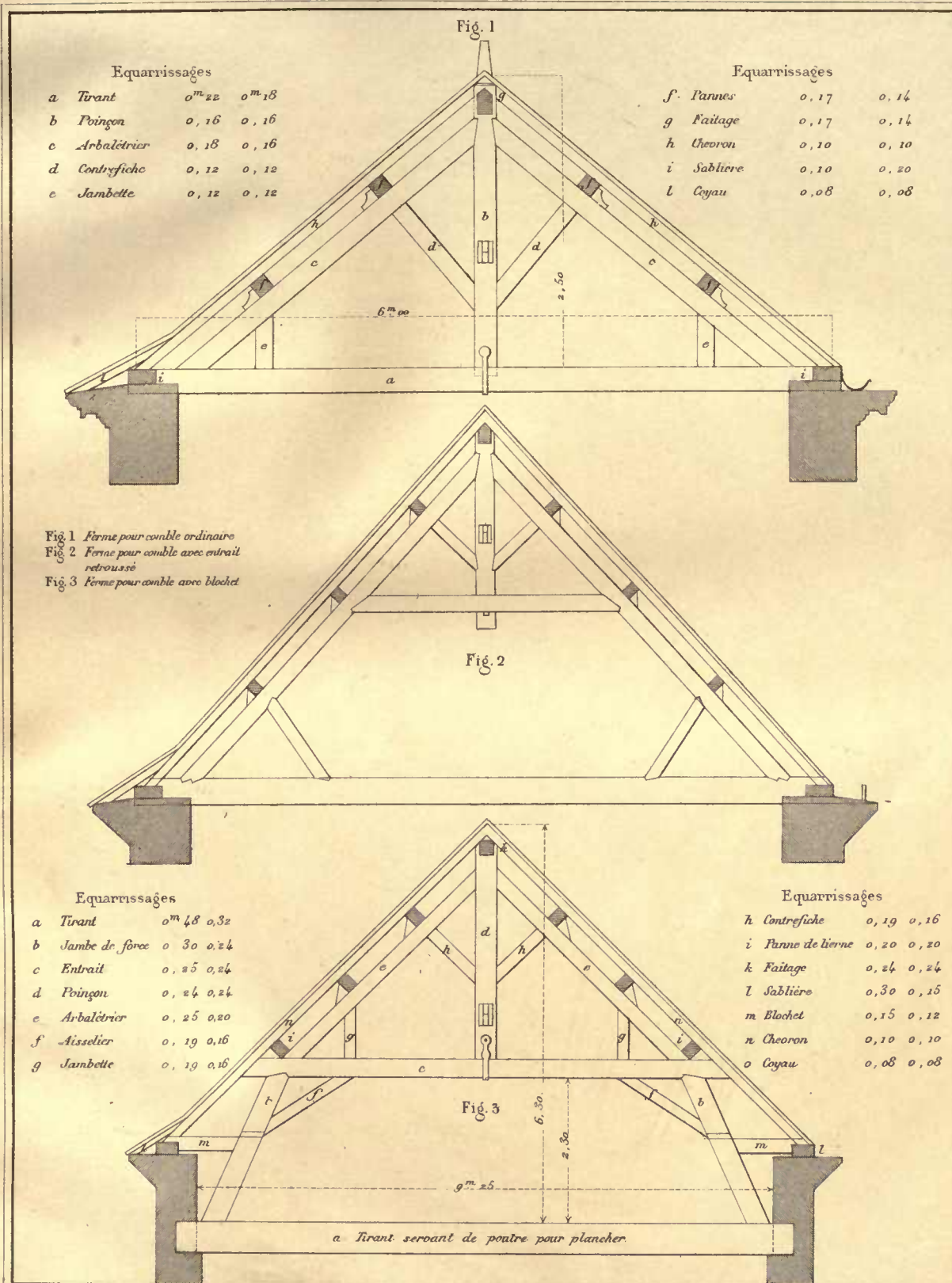


P. Enquie, del.

CHARLES SCHMID, EDITEUR, 51 Rue des Ecoles, Paris

Strasmann, sc.

Les pans de bois avec une stabilité moindre sont employés pour remplacer les murs. Les pans de bois intérieurs ne diffèrent de ceux extérieurs que par l'épaisseur qui est plus faible pour les intérieurs. Pour un pan de bois de 4^m00 de hauteur en donne 0,26 aux poteaux corniers, 0,15 à ceux d'huissierie et de 0,10 à 0,12 à ceux de remplissage — lorsque les pans de bois s'élèvent de 3 à 4 étages les poteaux corniers ont de 0,25 à 0,30 et les sablières de 0,20 à 0,25 — le pan de bois est rempli soit par des lames de bois, soit par des briques s'il doit être apparent, soit par des plâtres maintenus par des lattes s'il doit être enduit. Le mieux est de laisser les bois apparents.



P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles Paris.

Strueman, sc.

On nomme comble la partie située au dessus d'un édifice et sur laquelle on applique la couverture destinée à la garantir contre les intempéries des saisons. Pour porter cette couverture il faut établir de distance en distance (tous les 4 à 5 mètres environ) des assemblages de bois ou de fer que l'on nomme fermes. Les dispositions de ces fermes varient suivant les besoins, les matériaux employés pour la couverture et le climat. Nous donnons ici trois exemples pour combles droits.

Fig. 1. 2. 3. Tracés divers de combles à la Mansard avec entrain inférieur.

Fig. 4. Comble à la Mansard sans entrain inférieur.

Fig. 1.

a tirant
b jambe de force
c entrain
d pignon
e arbalétrier
f aissoiers
g jambettes
i pannes de brisis
h faîtage
l sablière
m coyau
n échantignolle

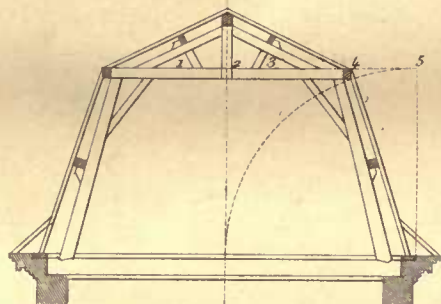
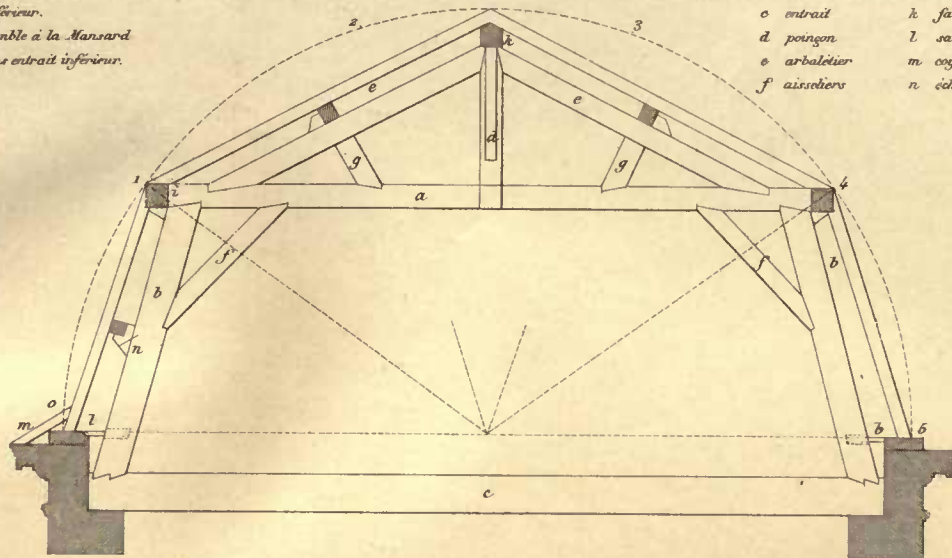


Fig. 2.

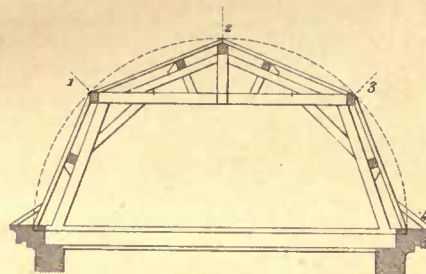


Fig. 3.

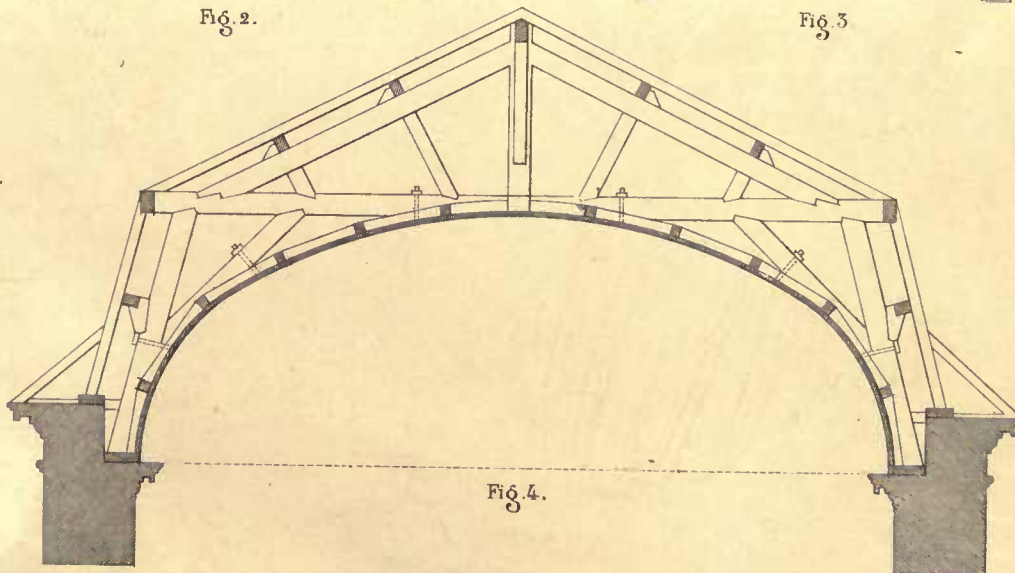


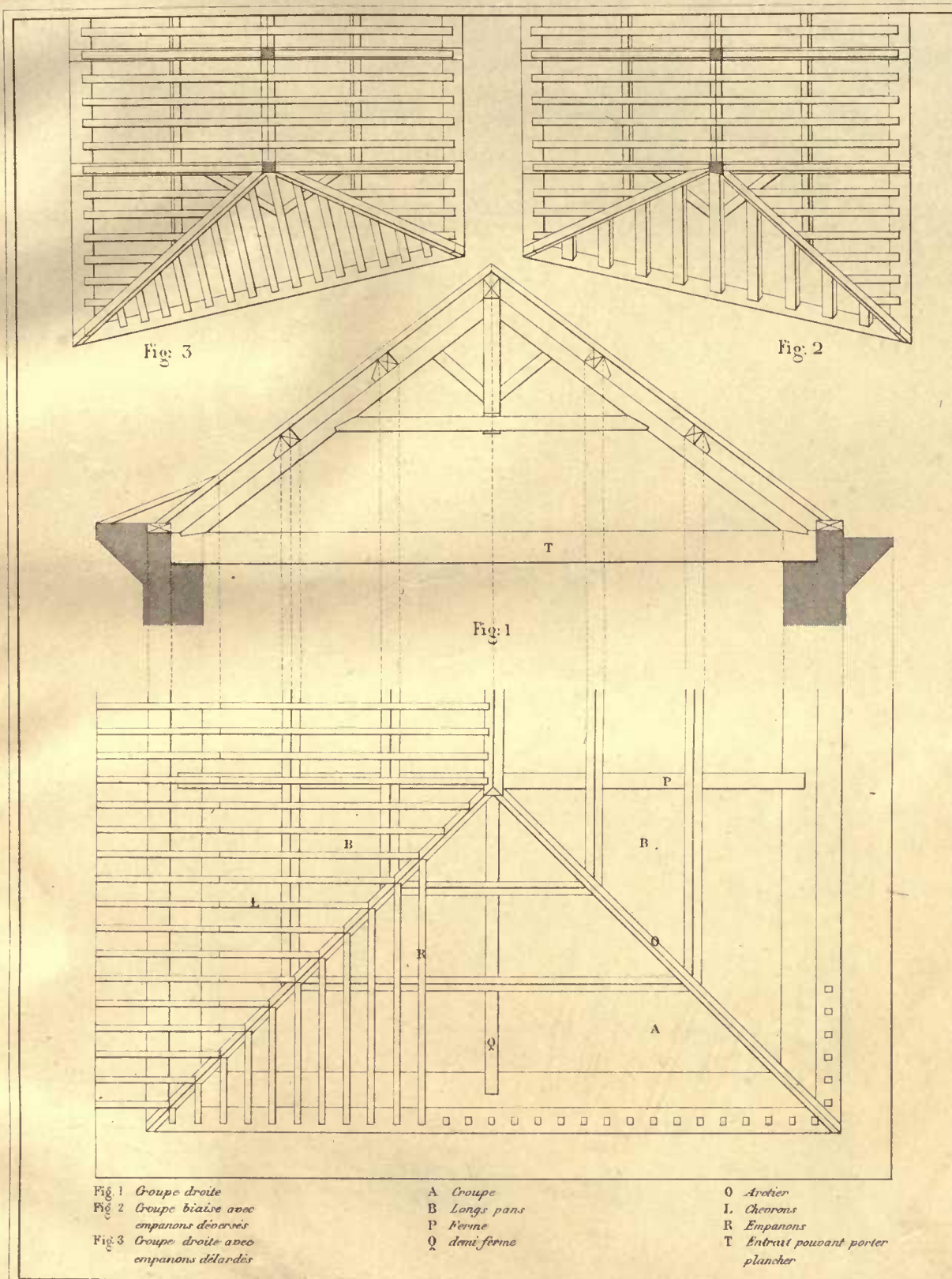
Fig. 4.

P. Esquié, del.

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Strassmann, sc.

Les fermes à la Mansard s'espacent comme les autres fermes, en général, de 4 à 6 mètres. Lorsque les combles types Fig. 1. 2. 3 doivent servir à l'habitation, on supprime les aissoiers, f que l'on remplace par des équerres en fer. Le tirant a reçoit alors une série de pièces de bois espacées de 0,33 d'axe en axe et d'un équarrissage de 0^m17 x 0^m07, sur lesquelles sont clouées les lattes destinées à recevoir l'enduit en plâtre.



P. Esquieu del.

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Straumann sc.

Quand les combles ne se terminent pas par des pignons on établit à leur place des pans de bois inclinés. Ces pentes triangulaires en charpente placées aux extrémités d'un comble portent le nom de croupes. Si les murs sont à angle droit la croupe est dite droite. Si les murs ne sont pas ainsi disposés la croupe est dite biale.

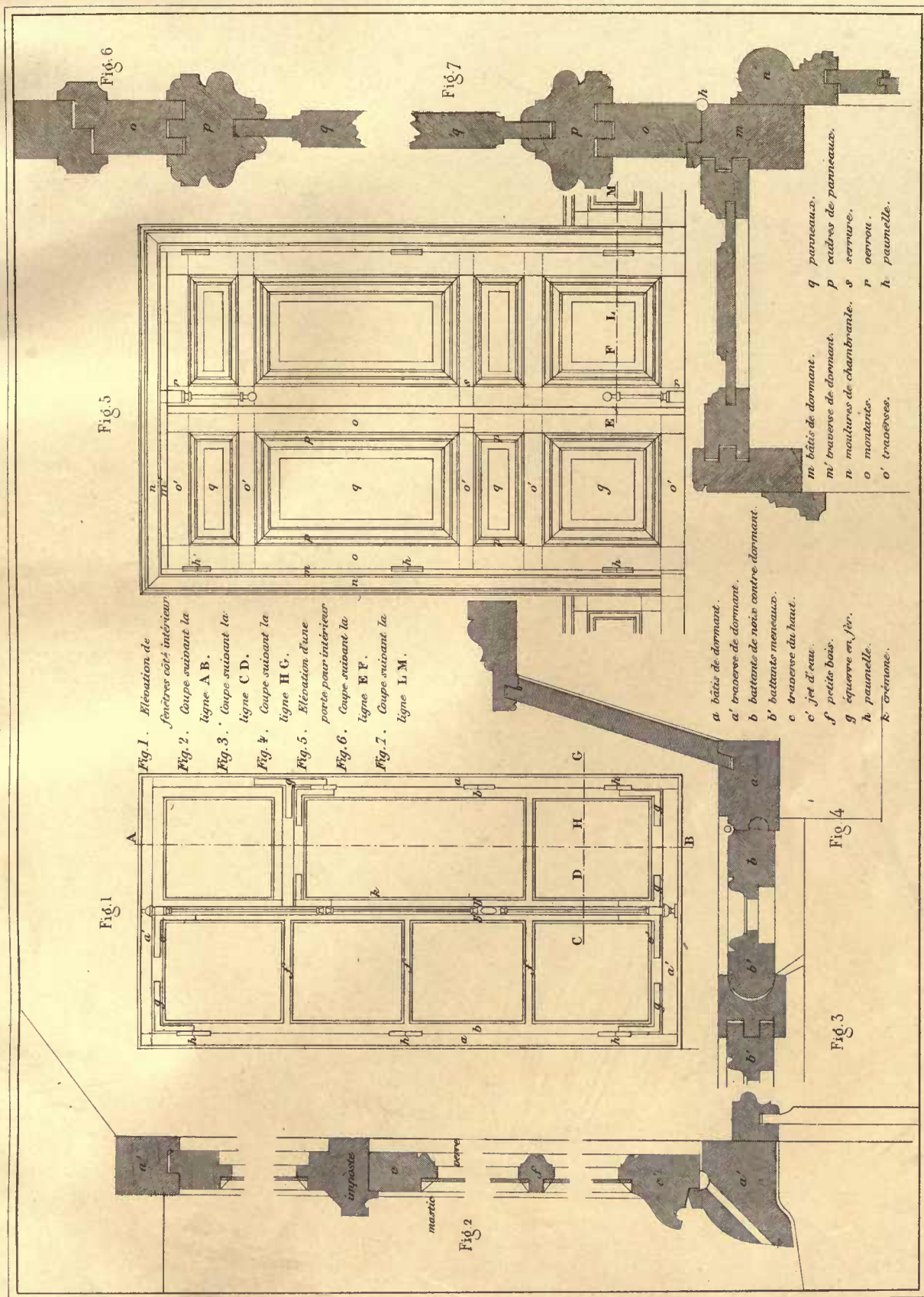


Fig 1

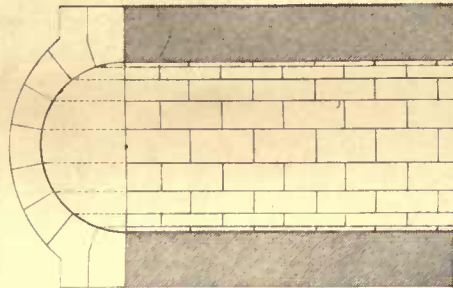


Fig 2

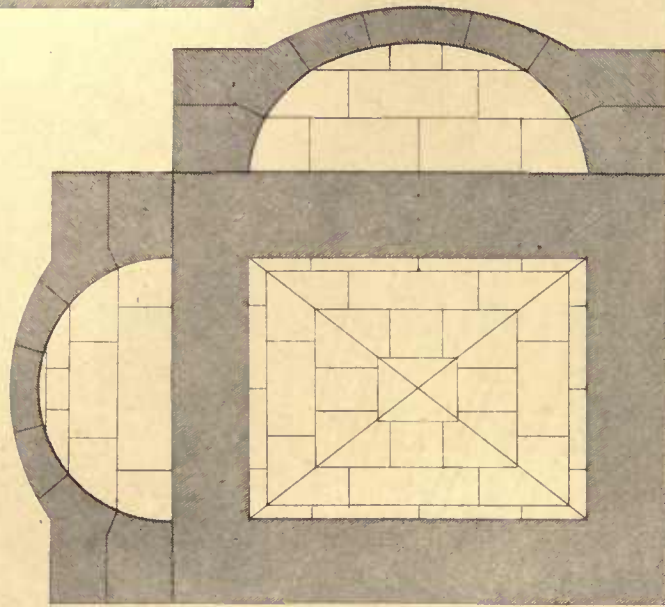
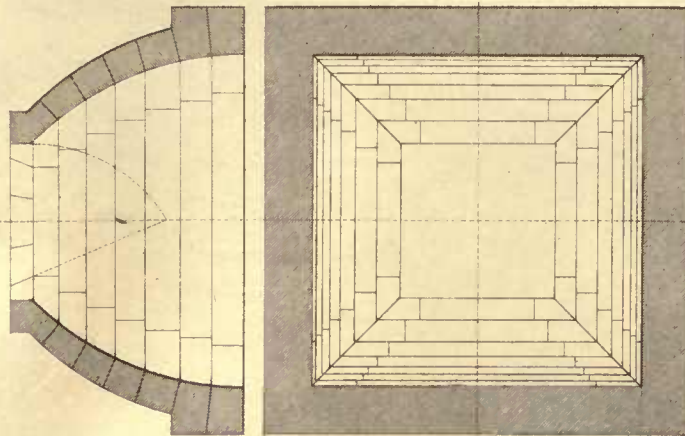


Fig 3



- Fig 1 Voûte en berceau
Fig 2 Voûte en arc de cloître
Fig 3 Voûte en arc de cloître
vue par le haut

P. L. qui, del
la, fig 1 représente une voûte en berceau droit avec son appareil en pierre.

Charles Schmid, Editeur, 51, rue des Écoles - Paris.

La fig 2 et 3 représentent deux voûtes dites en arc de cloître. La fig 2 est à droite, formée par l'intersection de deux berceaux, ces deux berceaux posent être semblables et qui simplifie la disposition. Lorsque l'on veut faire pénétrer la lumière par la partie supérieure on emploie la disposition de la fig 3.

Stemann, sc.

Fig. 1 *Toûte d'arête barlongue*Fig. 2 *Toûte d'arête à double arc-boutant avec pendentif*Fig. 3 *Toûte d'arête à double arc-boutant et à pans coupés*

Fig. 1

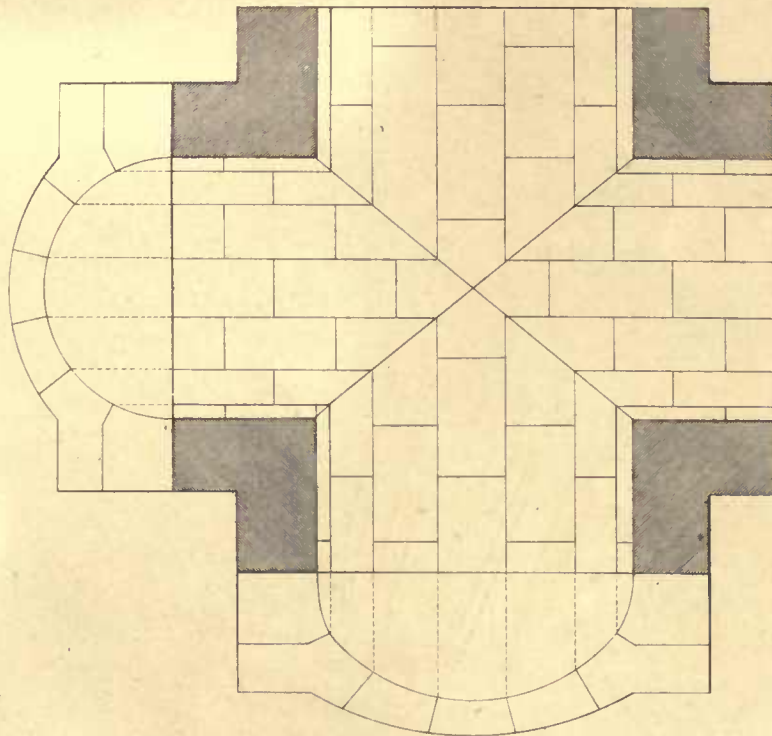


Fig. 3

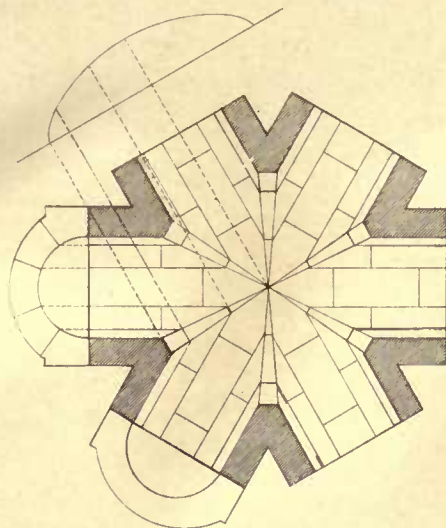


Fig. 2

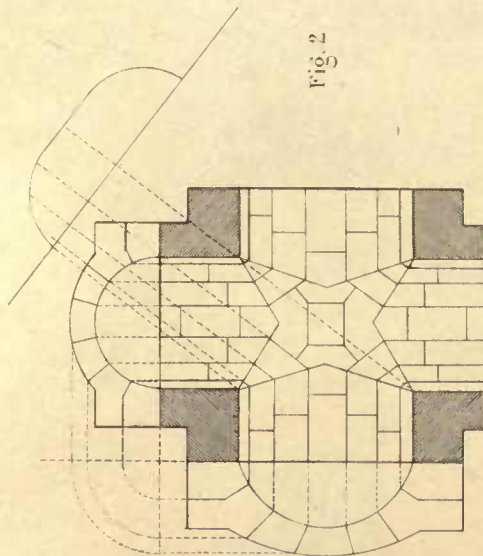


Fig. 1

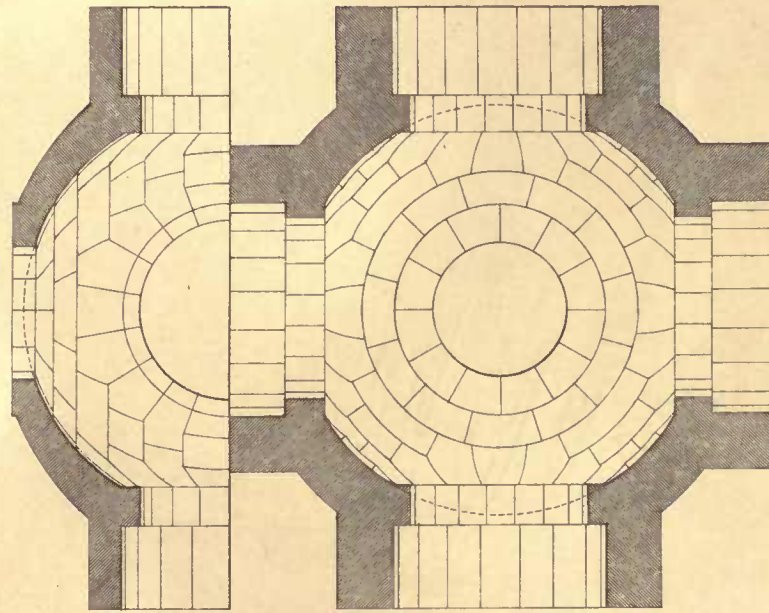


Fig. 2

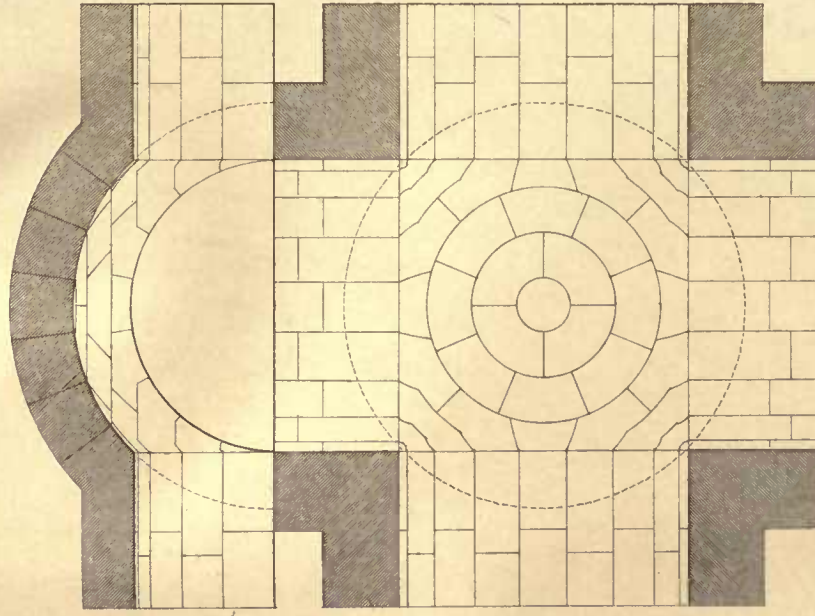


Fig. 1 Voûte sur pendentif avec
trumeaux, lunettes et arcs
doubleaux.

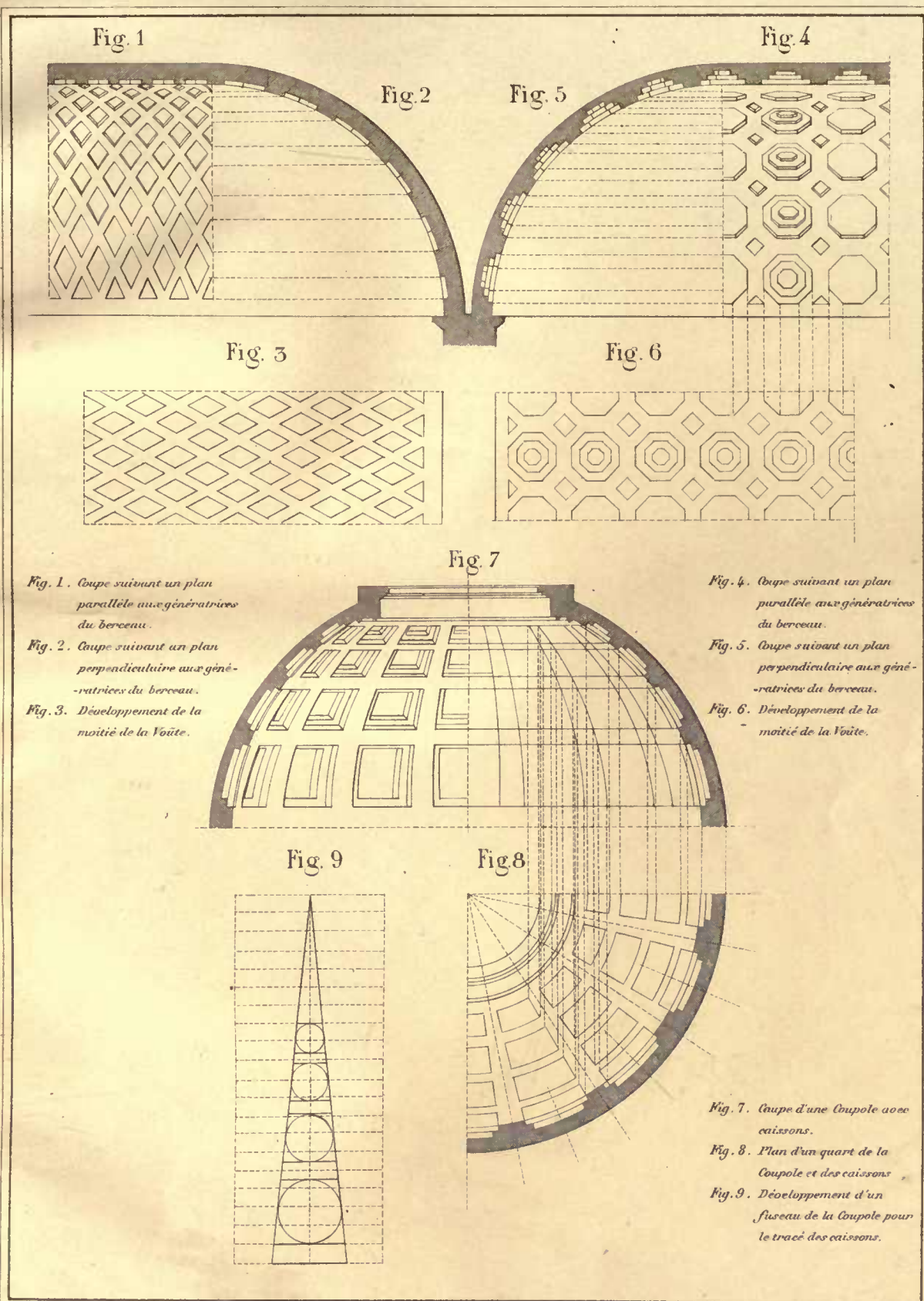
Fig. 2 Voûte sur pendentif avec
lunettes.

P. Esquié, del.

CHARLES SCHMID, ÉDITEUR, 51, Rue des Ecoles - Paris.

Strasbourg, St.

On obtient la voûte en coupole sur pendentif en coupant une sphère par quatre plans verticaux. Lorsque l'on veut faire pénétrer la lumière par la partie supérieure en coupe par un cinquième plan qui dans ce cas est horizontal. Nous donnons deux types d'appareil pour ce genre de voûte, renvoyant aux volumes traitant spécialement la coupe de pierre pour plus de détails.



P. Roqué, del.

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Strassmann, sc.

Les caissons sont des compartiments creux formés sur la surface d'une voûte afin d'en diminuer le poids tout en conservant la solidité désirée, les caissons sont susceptibles d'offrir un degré de richesse appropriée à l'édifice à décorer, soit par leur forme soit par les ornements qui seront appliqués. Nous donnons ici quelques exemples. Pour tracer les caissons en projection il faut pour les berceaux développer une portion de voûte suffisante pour avoir tous les éléments de la décoration. On reportera ensuite toutes les parties aux moyens des génératrices de la surface. Pour les coupôles on ne peut exactement développer la surface on ne peut donc opérer que par approximation en développant un fuseau que l'on prendra le plus petit possible.

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